

# FLIGHT

*The*  
**AIRCRAFT  
ENGINEER  
&  
AIRSHIPS**

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Founder and Editor : STANLEY SPOONER

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## Flight

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### "FLIGHT" PHOTOGRAPHS

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For Prices and Sizes, see Advert. on page v.

### DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list—

1928

- Nov. 15.... Lecture, "Aeroplane Engines in Flight," by R. J. Penn, before R.Ae.S.
- Nov. 22.... Lecture, "Weight of Aircraft," by Maj. T. M. Barlow, before R.Ae.S.
- Nov. 29.... Lecture, "Production Problems," by F. Sigrist, before R.Ae.S.
- Dec. 3-8.... International Aeronautical Exhibition, Chicago, Ill.
- Dec. 6.... Lecture, "Control of Aeroplanes by Alulas," by Capt. A. P. Thurston, before R.Ae.S.
- Dec. 12-14 International Conference on Aviation, Washington, U.S.A.

1929

- July 16-27 7th International Aero Exhibition, Olympia
- Oct. 31.... Guggenheim Safe-Aircraft Competition Closes

## EDITORIAL COMMENT



REFORM of the Royal Australian Air Force is a subject that has for some years past been discussed in the Commonwealth, and naturally conflicting opinions were held as to what should be done. Our contemporary, *Aircraft*, of Melbourne, urged that only an outside authority of great experience could give an opinion which all parties would respect, and that course was ultimately adopted. It is typical of the sound commonsense which has all along inspired the Commonwealth Government's attitude towards flying, that Air Marshal Sir John Salmond should have been invited to report on the present condition of the R.A.A.F. and advise as to its future. While cabled items concerning the report reached this country some time ago, we are able to publish in this issue of FLIGHT a fairly full summary of the report itself. The cabled summaries laid too much stress on the sentence, "the R.A.A.F. would be totally unfit to undertake war operation in conjunction with the Navy or Army." As the only operational units of the R.A.A.F. were one fleet co-operation flight using Seagulls, and two composite squadrons of which only one-third of the personnel was regular, while in each squadron there was one flight of D.H. 9s, one of D.H. 9A's, and one of S.E.5A's, it did not need the visit of an Air Marshal from Great Britain to arrive at a conclusion which must already have been perfectly obvious to Air Commodore Williams, Chief of the Australian Air Staff. In fact, if we divide Sir John Salmond's report into two halves, destructive criticism and constructive suggestions, we find the latter infinitely the more interesting of the two. The destructive section contains only two points of real interest: (1) The system of the composite squadron must, of course, go by the board; and (2) the Experimental Station at Randwick should be closed down. The latter is particularly interesting, as it recalls the old-time feeling in Great Britain between the Royal Aircraft Factory at Farnborough and the Trade. Australia was dabbling with a sort of Farnborough factory, and Sir John Salmond says

that it should either be developed to its logical conclusion, or it should be closed down. The latter course will be adopted, and this will be good news for the embryo aircraft industry of Australia, especially as the report points out in another place that with the coming re-equipment with new types, and with the Repair Shop at Taverton nearing completion, the amount of work for outside contractors is likely to be small for some time to come. But though there may be a temporary slump in reconditioning, the whole tenour of the report holds out a much brighter future for the aircraft industry of Australia; and also should stimulate the interest of British constructors in Australian requirements. For example, Sir John advises Australia to watch carefully the evolution of the torpedo-bomber, and, when stability has been reached, to adopt that type. We know that a sound choice of "general purpose" machine has been made in the Wapiti, and we are waiting to hear what type of fighter will be selected.

On the constructive side, Sir John Salmond insists on a number of all-regular units. It is not a novel principle in Australia, for No. 101 Fleet Co-operation Flight was manned by regulars. Naval co-operation, army co-operation, coast defence, and, above all, air fighting, are to be taken entirely out of the hands of Citizen Air Force personnel. That element is to be confined, as in the United Kingdom, to bombing squadrons, and this term does not include the two bomber-reconnaissance squadrons. In respect of personnel and its functions, the R.A.A.F. will be brought almost completely into line with the R.A.F. The two bomber-reconnaissance squadrons alone do not seem to correspond exactly with any R.A.F. units; but it is obvious that their future rôle is to be coast defence when the torpedo-bomber type has been stabilized. For the rest, the organization of the landplane units is straightforward adaptation of the R.A.F. model to Australian needs.

Sir John Salmond's recommendations concerning the units equipped with sea-going aircraft may have required rather more consideration. In a country with a small population he could not always recommend the ideal, but had to cut his coat according to his cloth. The pilots for these flights will be trained at the Royal Military College, Duntroon; they will be taught to fly by an army co-operation squadron; and they will do "a short course in flying sea-going aircraft at No. 1 F.T.S." There is no mention of a

school of naval co-operation among the recommendations or of sending a R.A.A.F. officer to Lee-on-Solent for instruction in that work. It remains to be seen whether the Royal Australian Navy will be satisfied with the provisions made for training naval airmen.

The other recommendations regarding flying training are ingenious and appear to be a sensible adaptation of methods to material. The permanent regulars are to be taken away from No. 1 F.T.S. at Point Cook altogether. So are the C.A.F. pilots. That school is to deal only with short-service commission officers and airmen-pilots. The permanent regulars are to be educated at Duntroon and taught to fly by the squadron at Canberra. The Citizen Air Force officers will all receive flying instruction from their own squadrons.

The geographical side of the report has an interest of its own. West Australia is an isolated State, though the opening of the Perth-Adelaide airway next April will abolish much of that isolation. Hitherto West Australia, while showing the whole world how a civil airway ought to be run, has not figured at all in the air defence scheme. Now Perth is to have its C.A.F. bombing squadron, an obvious development on every conceivable ground. What is more, one of the three slipways for seaplanes is to be at Albany, in West Australia. The other two are to be at Darwin and Brisbane, the most important centres on the northern and eastern coasts.

The two flights of flying boats are to be stationed at Point Cook and Lake Macquarie. The former is chosen on the grounds of economy in peace time. Sir John, it appears, does not regard Victoria as of primary importance from the air defence point of view. The Victorian flight of fighters is not to be completely mobile. New South Wales and Queensland appear to be of more consideration to him. New South Wales is to have a Wing headquarters, the fighter flight at Richmond is to be completely mobile, and the N.S.W. flight of boats will be stationed at Lake Macquarie, between Sydney and Newcastle, with a slipway at Brisbane, and suitable alighting water for 2,000 miles up the coast.

The Government of Mr. Bruce has accepted this report and undertaken to carry out the expansion for the first period of three years. It is scarcely conceivable that any future Commonwealth Government will not carry the programme on to its conclusion.

### Air Club Trophies

THE instructors of the now defunct Beardmore Flying School have left a lasting memorial of their interest in Scottish aviation by their donation to the Scottish flying club of two handsome silver cups which are to be offered as prizes for competitions to be organised from time to time. Flying contests are to be arranged as soon as the weather permits. The club is making progress and new members are continually being enrolled, while others are rapidly qualifying. Three machines are now in commission, a new D.H. "Moth" having been purchased recently. One member has been doing excellent propaganda work by giving a series of lectures in some of the boys' schools in Glasgow, thus helping the younger generation to become airminded.

### "Punch" Almanack

XMAS comes but once a year—and the same, unfortunately, applies to "Punch" Almanack. The arrival of the latter this week is a reminder of the former, and this year the world-wide favourite excels itself for humour. Many of the illustrations in colour are delightful, and in the very best form by "Punch" artists, whilst the letterpress and black and whites are as full of point as ever. Raven-Hill, in a double-page colour picture, is irresistible in his carica-

tures of leading politicians, authors, &c. E. H. Shepard is responsible for several graceful drawings, one comparing the old elopement with the new, the latter ending, via the air, happily and ingeniously. On every page of the issue there is, indeed, the enjoyment of spontaneous fun. Altogether a delightful shillingsworth.

### New Air Mail Leaflet

THE Postmaster-General announces that a new edition of the Air Mail Leaflet giving particulars of the winter services is now available. Apart from the usual temporary suspension of the services to certain countries during the winter, the more important alterations shown in the leaflet are as follows:—Reduction of the air fee for the United States and Western Canada (air transmission in the United States) from 9d. to 7d. per ounce. Reduction of parcel rates to Colombia (transmission by air in Colombia) from 7s. 6d. per lb. to 4s. 6d. per lb., with a minimum charge of 10s. New service to Algeria, by air from Marseilles, with a fee of 3d. per ounce. Parcels for air transmission can now be accepted at all offices which accept imperial and foreign parcels. Copies of the new leaflet may be obtained from any Post Office. It is in stock at the larger offices, and where it is not in stock it can be obtained at short notice.



# THE PORTUGUESE FLIGHT TO AFRICA

## A Fine Achievement by British Aircraft and Engines

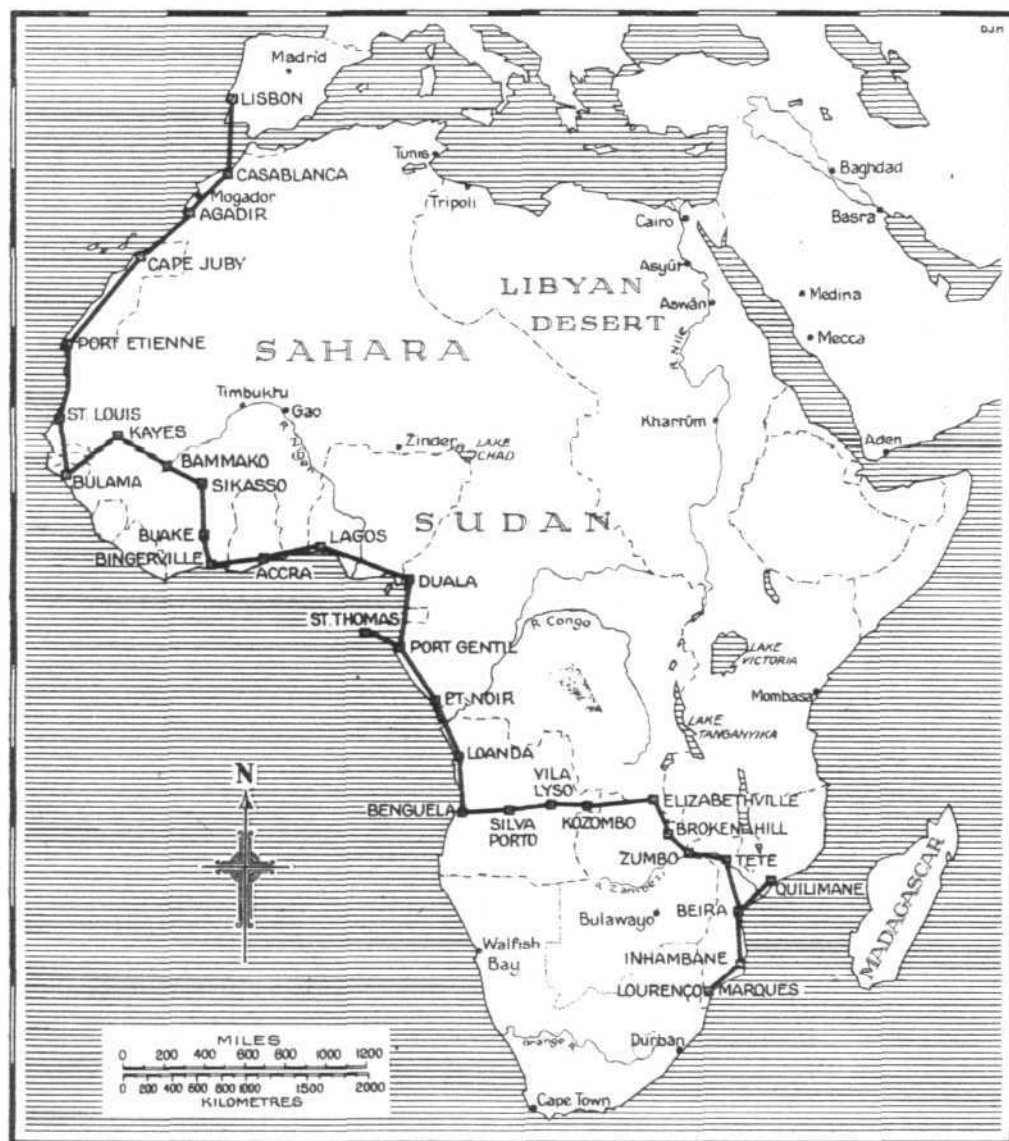
As briefly reported in our issue for Nov. 1, the two Portuguese airmen, Capt. Pais de Ramos and Oliveira Viegas, have succeeded in their flight of over 9,900 miles from Lisbon to Mozambique. Although little or nothing has been heard of this flight in the general press, it is, we think, one of exceptional merit, not only as regards the two pilots and their companions—Lieut. Jose Esteves and Serg. Manuel Antonio—but also on the part of the two Vickers "Valparaíso" biplanes and their Napier "Lions" which were used on this flight.

It should be pointed out in connection with the machines, that these had been supplied to the Portuguese Air Force some time ago and had been in service prior to this flight. Throughout the "raid" no serious trouble was experienced with either machine or engine, and only once—towards the

some anxiety, as it was known that the French airman Assolent, who was making the same trip, had to return to Casablanca owing to bad weather. However, it was learnt later that they had arrived safely, having made the trip from Casablanca in 2 hrs. 30 mins.; the first day's flight was therefore 826.5 miles, in 5 hrs. 20 mins. flying time.

Between Casablanca and Agadir they followed the coast as far as the river Unn Er Rebia, then crossing through the desert to Seis, over the El Gharaba mountain to Mogador via the Akurmet plain.

The next day anxiety was once more caused by the absence of news of the airmen's progress, especially as their next stage, to Cape Juby (298 miles), was a particularly dangerous one—there being no safe intermediate landing places, to say



The Portuguese Flight to Africa: The route followed by Capt. Pais de Ramos and Oliveira Viegas and their companions in their 9,900-mile flight in two Vickers "Valparaíso" biplanes (Napier "Lion" engines).

end of the journey—did the two pilots part company, and then only for a day. Only more or less minor repairs or adjustments had to be made at certain points, and these were easily accomplished and did not seriously delay the flight which was carried out practically according to plan.

As we pointed out at the time of the start, the route followed by the two pilots broke new ground (or air?) over several sections of the route and was in many places accompanied by great risks and dangers. It was certainly a very interesting one as the accompanying map will disclose.

While we have reported the progress stage by stage of this big flight in previous issues, we think a general résumé from start to finish will be of interest now. The four airmen, in the two "Valparaíses," left Lisbon on September 5, and made their first stop at Casablanca, proceeding the same day to Agadir (Morocco). No news of their arrival at Agadir was received (owing to a temporary breakdown of the Morocco postal service) until the following day. At first this caused

nothing of unfriendly Moorish tribes ready to make them prisoners if they did manage to effect a forced landing.

Eventually, however, news was received that they had reached Cape Juby safely, having followed the coast line most of the way. During the next three days they completed the first section of their flight by reaching Bulama in Portuguese Guinea, 2,529 miles from home. This was accomplished in three stages—Port Etienne, St. Louis and Bulama. The complete section, Lisbon-Bulama, was effected in 22 hrs. 50 mins. flying time, or at an average speed of 105.6 m.p.h.

After a stay of four days, the Portuguese airmen proceeded on their way once more, leaving Bulama on September 14, for Kayess (Upper Senegal), this time flying through the interior instead of along the coast. Torrential rain and a shortage of fuel forced them down at Tomba Counda, so it was not until the next day that Kayess was reached—also in torrential rain. Still continuing over land, Bammako on the river Niger was reached on September 16, then, turning

southwards, Sikasso and Buake (Bonake), both in French Senegambia, were made on September 17.

The next stage, on September 18, brought the airmen once again to the coast, at Bingerville (French Ivory Coast), where a stop for a few days was made to carry out minor repairs and adjustments. Off again on September 21, Accra on the Gold Coast was the next stop, where a broken radiator had to be repaired, then, still following the coast, Lagos on September 22, and Duala (Cameroons) on September 23.

Here bad weather held up the airmen, and it was not until September 27 that they arrived at Port Gentil, in spite of it. On September 29, a flight of nearly 200 miles over sea was made to the Island of St. Thomas, where the airmen were given a very enthusiastic reception and many "festivals" in their honour. They left again, amidst a rousing send-off on October 2, and returned to Port Gentil, continuing the same day on to Point Noir. On reaching Loanda (Angola), on October 3, the second section of their journey was completed, and some 6,500 miles accomplished.

The third and last section was, perhaps, the most difficult of all, for it necessitated crossing Central Africa from west to east coast, over certain portions of which aircraft had not hitherto flown. Before actually leaving the coast the airmen proceeded to Benguela on October 9, and then turned inland on October 11 after a short hold-up owing to minor engine trouble. Weather was very unfavourable, but they arrived safely at Silva Porto, on the Benguela railway.

The next stage was to Kozombo, which was accomplished on October 13-16, an intermediate stop being made half-way at Vila Luso. Continuing on October 16, they flew to Elizabethville, Broken Hill, and Zumbo, but were unable to reach Tete the same day as originally intended. They arrived at Tete the following day, and on October 19, set out for Beira. One of the pilots, Capt. Viegas, had to land at Chemba (Zambesia) en route, but continued his journey to Beira next day.

Quilimane was reached on October 22, and later the airmen returned to Beira, where minor repairs were effected. On October 25 and 26 the concluding stages of the flight were accomplished—to Inhambane and Lourenco Marques. Thus in seven weeks and three days they had covered a distance of about 9,950 miles, and had visited the principal Portuguese African Colonies.

The log of the flight from start to finish, with approximate distances between stages, is as follows:—

Sept.	Miles.	Flying Time	
		Hr.	Min.
5 Lisbon (Amadora)—Casablanca—Agadir...	826.5	5	20
6 Agadir—Cape Juby...	298	2	30
7 Cape Juby—Port Etienne...	646.5	6	20
8 Port Etienne—St. Louis...	404	4	20
9 St. Louis—Bulama...	354	4	20
14 Bulama—Tomba Counda...	354	4	20
15-16 Tomba Counda—Kayes—Bammako...	298	3	15
17 Bammako—Sikasso—Buake...	503.5	5	15
19 Buake—Bingerville...	199	2	8
20 Bingerville—Accra...	298	3	15
22 Accra—Lagos...	301	3	14
23 Lagos—Duala...	497	5	20
28 Duala—Port Gentil...	404	4	20
30 Port Gentil—St. Thomas...	168	2	20
Oct.			
2 St. Thomas—Port Gentil—Point Noir...	590.5	6	30
3 Point Noir—Loanda...	354	4	7
9 Loanda—Benguela...	310.7	2	40
11 Benguela—Silva Porto...	310.7	2	50
13 Silva Porto—Vila Lyso...	416	4	30
16 Vila Lyso—Elizabethville—Broken Hill—Zumbo...	932	7	0
17 Zumbo—Tete...	155	1	20
19 Tete—Beira...	279.6	3	20
(No. 2 machine landed at Chamba, arrived at Beira on October 20.)			
22 Beira—Quilimane...	248.5	2	20
24 Quilimane—Beira...	248.5	2	50
25 Beira—Inhambane...	279.6	3	10
26 Inhambane—Lourenco Marques...	273.4	3	40
Total	9,950	100	34

## AIR MINISTER'S SPEECH AT GUILDHALL BANQUET

SIR SAMUEL HOARE, in reply to the toast of "Imperial Forces" at the Guildhall Banquet on November 9, said that it was the first occasion upon which a representative of the Royal Air Force had had the privilege of responding to a toast that included the Army and the Navy. Three years had passed since he last had the chance of speaking of the Royal Air Force at a Guildhall Banquet—three years of constant change and, he believed, of steady progress. He took as illustrations the events of the last few months.

A week ago, a young Flight-Lieutenant of the Royal Air Force established a British record, and in so doing proved himself to be the fastest flyer in the world. What better evidence could he give of the skill and dash of Air Force pilots, excellence of British construction, and progress in increasing the performance and at the same time diminishing the weight of engine and machine? Through no fault of his own Flight-Lieut. Greig, although he exceeded the speed of any other flight, missed by a fraction of a second the necessary margin to constitute a technical world record. They wished him the best of luck if and when in due course he made another attempt, and if he knew anything of the determination of the Royal Air Force to achieve any task that they have undertaken, he would certainly succeed.

**The Air Route to India.**—Sir Samuel then took a second illustration drawn from a different field of activities. Two years ago they started upon the organisation of a civil flying route between England and India. They believed that if the British Empire was to obtain advantages from aviation commensurate with the heavy expenditure that is involved in air defence, the aeroplane and the airship must be used for speeding up Imperial communications, and that the most useful line of advance in achieving this end was an air route to the Far East. He had hoped that months ago a weekly service between London and Karachi, taking five or six days, would be in operation. Unfortunately, international difficulties stood in the way. He was glad to be able to make the first official announcement that those difficulties are finally removed, and that the service would start in the early spring. He took that opportunity of saying how glad he was to have obtained the co-operation of our Italian friends and comrades for the European section of the route, and how certain he

was that the agreement reached between ourselves and Persia would be of great advantage to our respective countries.

It was satisfactory to note that this conspicuous development in civil aviation took place at a time when the Imperial Airways Company had, by paying its first dividend, made a record amongst the principal flying companies of the world.

**The Air Defence of London.**—He took the third illustration of the progress that they had been making.

Three months ago the most extensive air exercises took place over London that have been attempted by any country since the war. They were not held for the purpose of air propaganda. The exercises were held for one object, to test the efficiency of the units engaged in them. He was glad to say that the results were most satisfactory, and that in particular the two London Auxiliary Squadrons in which the City and County of London have taken so close an interest, more than justified the high hopes that had been placed upon them when formed three years ago.

Altogether 25,000 hours were flown during the exercises both by day and night, with an almost complete lack of engine failures, no injury to a pilot and a serviceability of machines of practically a hundred per cent. Those facts were sufficient to show that the Air Force with the most efficient and patriotic support of the Territorial Searchlight Units and the Observer Corps, was making conspicuous progress with the very formidable task of the air defence of London.

He did not, however, wish to end upon what can be even remotely considered a warlike note. Urgent though he believed to be the defence of London, he was none the less certain that the forces of peace, and not the forces of war were gaining strength in the world. We were not making these defence preparations because we believe a war to be likely. We were making them simply, and only because a great country like ours could not live on suffering and must insure against risks that, however, remote, were pregnant with disaster. These modest preparations of defence must, therefore, steadily proceed. They need not, however, distract minds from the need of agreement between the great powers of Europe upon the question of air armaments. We did not want a competition of armaments in the air.

### Dutch East Indies Air Mail

THE fifth Fokker monoplane (Armstrong Siddeley "Lynx" engines) which recently flew from Amsterdam to

Batavia as one of the fleet inaugurating the Dutch air mail line, started on its return flight on November 7. It landed at Rangoon for petrol on November 9 and then reached Akyab.



# THE BRISTOL "JUPITER" FAMILY—(II)

(Continued from page 972)

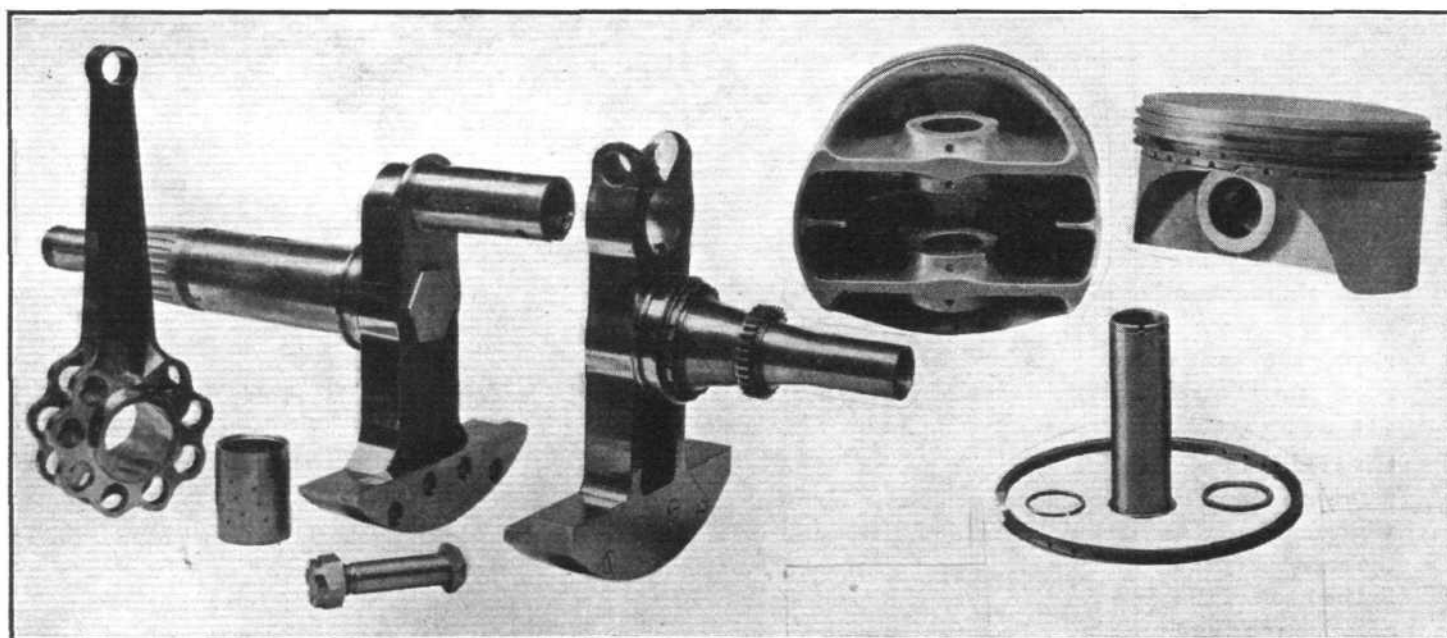
## The Crankshaft and Big End Bearing Assembly

ALL engines of the "Jupiter" family now have their crankshafts of the two-piece type, this arrangement having certain advantages such as making possible the employment of a solid type of big end, and a floating bush bearing for the master connecting rod. The method of construction is such that the two-piece crankshaft is quite as strong as would be a shaft made in one piece, the power-transmitting part of the shaft being formed by the front portion of the shaft, the front web, and the crankpin, while the portion of the crankshaft which is joined on has but relatively little work to do, being the rear web and the rear end of the shaft, whose work consists chiefly in driving the various auxiliaries at the back of the engine.

The two-piece crankshaft is made from a chrome nickel steel forging, with the two webs extending across to the side opposite the pin and carrying counterweights. The free ends of the webs are splayed outwards to form wedges on which the counterweights hang, the centrifugal loads thus being taken on the wedge-shaped ends of the webs,

ing was in perfect condition, and was, in fact, put back in the engine without needing any attention.

The eight articulated rods take their bearings on wrist pins accommodated in the holes in the master rod big-end flanges. These holes are not all at the same radius from the centre of the master rod big end, but are so placed as to compensate to some extent for the unequal stroke of the articulated rods which results from the varying obliquity of the master rod. The wrist pins are hollow, but near one end a small solid piece is left, which takes the securing bolt that holds the pins in place. Near one end of the wrist pin a fairly pronounced taper is ground, while at the other there is a very slight (outward) taper. The holes in the master rod are correspondingly tapered, so that when the wrist pin is inserted and drawn up against the flanges by the securing bolt, it is located axially by the taper seatings. The bolt head rests on the solid internal collar, while the outer end is accommodated in a cup-shaped retaining collar, the rim of which is flanged to bear on the master-rod big-end flange. Both ends of the articulated rods are bushed with



THE BRISTOL "JUPITER": Big end bearing assembly. Note that the adoption of a two-piece crankshaft has permitted the use of a solid type big end and a floating bush bearing for the master rod. On the right, two views of a piston, with special section oil scraper ring, fully floating gudgeon pin, washer and circlip.

and the work of the four bolts in each web being reduced to that of locating the counterweights in a direction parallel with the axis of the crankshaft.

The joint in the "Jupiter" crankshaft is made between the rear end of the crankpin and the rear web. The latter is bored to receive the pin, and is split at its outer end, as shown in one of our photographs. Bored transversely through the split end of the web is a hole for a heavy bolt, and when the pin has been inserted in the web and the nut tightened up; the web clamps the crankpin tightly. The rear web is located on the pin by a tongue machined in the hole in the web, opposite to the clamping bolt, and which engages with a slot cut in the crankpin. Or one may regard the tongue as an integral key, and the slot in the pin as the keyway.

The connecting rod assembly is of the one master rod and eight articulated rods type, with the big ends of the latter housed between the two large flanges formed on the big end of the master rod. The rods are of high tensile steel, of H section, and the master rod has a hardened steel liner pressed into the big end to provide a working surface for the phosphor-bronze floating bush. One of the greatest problems in the design of high-power radial engines is, perhaps, the bearing loads on the big end of the master rod, and it is claimed that by having a solid big end which enables a one-piece floating bush to be used, the load is halved, with vast increase in the effective life of the bearing. After the 25,000 miles' flight carried out last year, this bear-

phosphor-bronze bushes shrunk in and secured by two screwed brass dowels.

The crankshaft of the ungeared "Jupiters" (*i.e.*, the Series VI A, VI A.M., and VI A.L.) runs in three roller bearings, of which two are of the plain type and situated immediately behind the rear web and ahead of the front web respectively, while the third bearing is a combined thrust and journal roller bearing, and is situated towards the front end of the crankshaft, where, as a journal bearing, it steadies the relatively long front end of the shaft, while as a thrust bearing it transmits the airscrew thrust to the crankcase. This bearing is of the self-aligning, two-row type in which the outer ring has its inner surface ground to a spherical section, the rollers being barrel-shaped. The inner ring has two grooves which form tracks for the rollers, and the thrust is transformed into a crushing load on the rollers, which, owing to their contour, receive no end load whatever. In the geared series of engines (VIII, IX and XI) a somewhat different arrangement is used, due to the fitting of the Farman-Bristol type of reduction gear. The details of this were shown in the sectional view of the geared engine published on page 970 of last week's issue. In the case of the direct-drive engines, the advantage of the double-row spherical roller bearing is that assembly is simplified, no delicate fitting is required, and there is no risk, as in the case of an ordinary thrust race, of the ball race collapsing due to being nipped up too tightly when assembling. A spring-loaded phosphor-bronze oil retainer seals the front end so

that the double-row spherical roller bearing can be generously lubricated, with the result that the life of the bearing is greatly lengthened.

### Pistons

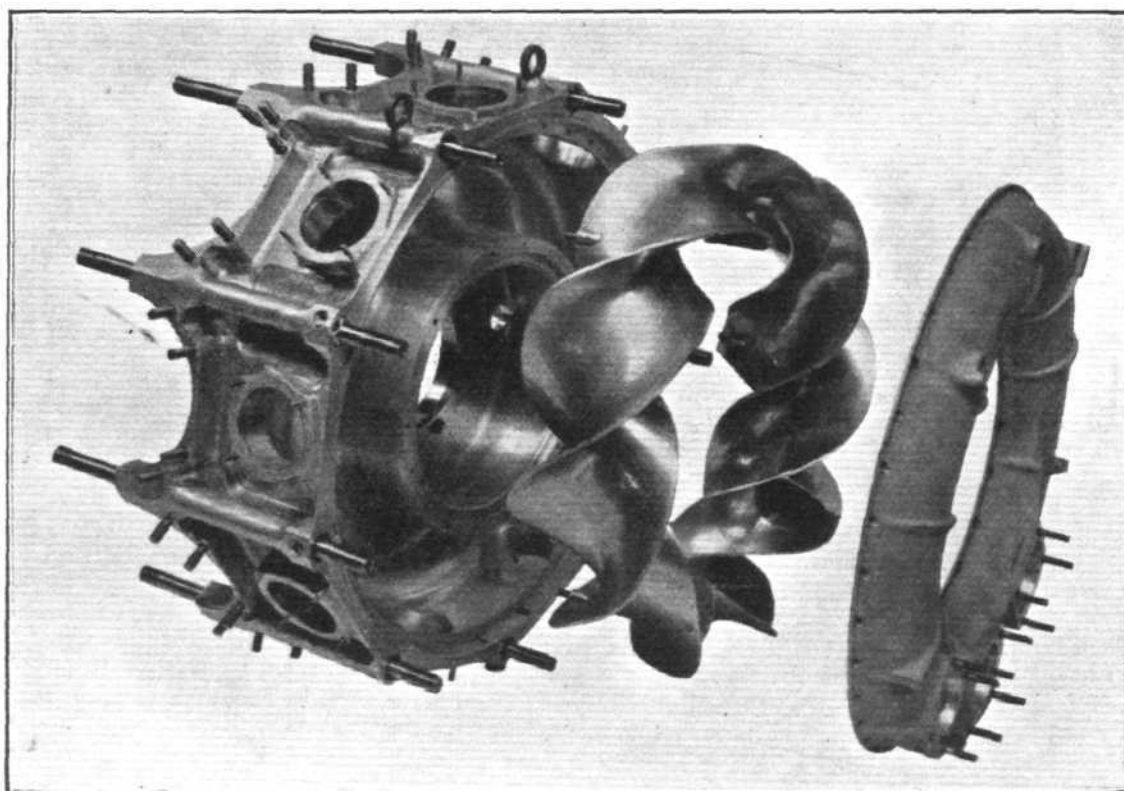
The pistons used in the Bristol "Jupiter" engines are the outcome of some 1,300 hours' development work carried out on single-cylinder experimental units running at full throttle and with the cooling air velocity greatly reduced so as to encourage overheating. As a result of these tests, a type of piston has been evolved which provides a highly satisfactory heat gradient, and consequently having a long life. The aluminium alloy pistons, which are of the slipper type, are cast from virgin metal in the Bristol Company's own foundries, and a special test procedure has been evolved so as to ensure that every piston is up to standard. Three piston rings are fitted, of which the two rings at the upper end are gas rings, while the ring at the lower end is an oil scraper ring of special section. In order to avoid damage to the piston skirt when the cylinder is removed, lugs are formed on the inside of the skirt, so that as the piston tilts over, one of these lugs comes up against the connecting rod and prevents it from touching the skirt itself. The lugs are clearly shown in one of our photographs.

The hollow gudgeon pins are of hardened steel, and formed with a shoulder at one end, which bears against the web

to meet them but one never does; because they are on a parallel spiral, but one at a different level. Perhaps this illustration may serve to give some idea of the formation of the Bristol induction spiral distributor. The pitch of the three convolutions is so adjusted that on its way around the circumference each convolution feeds three evenly spaced cylinders. That is to say, each start feeds three cylinders 120 degrees apart. Thus, one start feeds cylinders 1, 4 and 7; the next feeds 2, 5 and 8; and the third feeds 3, 6 and 9. Of the task of the patternmaker who made the original pattern for this casting this is not the place to write, but we do not envy him his job!

That this patented induction spiral has contributed largely to the smooth running of the "Jupiter" cannot be doubted, the arrangement not only ensuring absolutely even distribution but also a good mixture of the fuel, which is given a swirling movement by its passage through the spiral and by sheet metal deflectors fitted internally. It is not difficult to realise that exceptionally careful fitting is necessary if leaks are to be avoided where the spiral meets the casing and back cover, and in the final fitting use is made of paper washers between back cover of the spiral and the faced joint on the back of the crankcase. With this arrangement of the distribution it will be seen that in the event of failure of one carburettor, only three cylinders will be affected, and the engine will continue to run on the six remaining cylinders.

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 1 The Bristol  
 1 "Jupiter" In-  
 1 duction Spiral:  
 1 This photograph  
 1 shows very  
 1 clearly the crank-  
 1 case (machined  
 1 all over), the  
 1 three-start in-  
 1 duction spiral  
 1 which fits into  
 1 the annular space  
 1 in the back of the  
 1 crankcase, and  
 1 the back cover  
 1 for the spiral.  
 1  
 1  
 1 1 1 1 1 1 1 1



boss of the piston. At the other end, the gudgeon pin is retained by a washer and circlip. The gudgeon pin floats in both piston and connecting rod.

### The Induction System

A very original feature in the design of the Bristol "Jupiter" engines, and one common to all "members of the family," is the form of distributor employed in the induction system. This takes the form of a so-called three-start spiral, and perhaps its actual shape may best be understood from an examination of the photograph. This shows the rear half of the crankcase, the spiral, and the rear cover for the spiral. If one takes a specimen of the spiral and with a finger traces one convolution around for a complete circle, it will be found that throughout this passes between the other two convolutions. For exhibition purposes, the Bristol Company often exhibit a specimen spiral in which one "start" is painted white, the second blue and the third red. That forms a very convenient way of explaining the spiral, and in its absence it is a little difficult to do so. However, it may be likened to one of the spiral staircases one sees at certain London railway stations, where two sets of stairs wind up around a common centre line, but one is always, at any given point on the circumference, at a higher level than the other. If one is going up, one sees other passengers going down (if the staircase has an open well), one expects

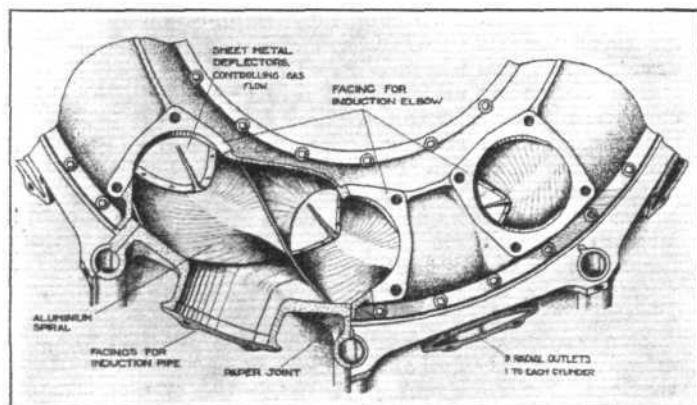
The outlets from the spiral to the nine separate induction pipes are evenly spaced in the circumference of the annular induction chamber, and are clearly visible in one of the photographs. On the back cover of the spiral, in the lower segment, are three facings for the induction elbow of the special Bristol Triplex carburettor.

Specially designed for the Bristol "Jupiter" engines, the "Triplex" carburettor consists of three carburettors combined into one unit. This has resulted not only in a saving in weight (approximately 50 per cent.), but also in a saving in space, and in the possibility of using but a single fuel feed pipe. One of our photographs shows the "Triplex" carburettor without its induction elbow and air intake. At the back and bottom of the carburettor may be seen the common fuel feed pipe which communicates with the three needle valves which, controlled by their three horseshoe-shaped cork floats, admit petrol to the three float chambers. Each of the three carburettors has its main jet, which is of variable type and is used also, apart from its normal setting at the works, as a mixture corrector or altitude control. Without going into great detail, it may be said that the variable main jet has a cylindrical valve head in which are cut three tapering flutings, so that as the valve is raised, the area of the flutes is increased, while when the valve is lowered, the area is reduced. The stem of the valve is provided with a four-start, quick-acting thread, and when the sleeve engaging



with this thread is rotated, the valve is raised. On the top of the sleeve is a dial which indicates the setting of the main jet. The altitude control lever is a friction grip on this sleeve, and is of course connected up to the controls in the pilot's cockpit. In the high-compression engines a form of "gate" is provided, so that the pilot cannot accidentally open the engine to full throttle at ground level, but has to push his lever through the gate to do so, an operation requiring conscious action on the part of the pilot.

The three variable main jets of the "Triplex" carburettor are interconnected by a link rod, as shown in the photograph, and a bell crank lever provides for connection to a common lever from which again a connection is made with the lever in the cockpit. The three butterfly throttles are mounted

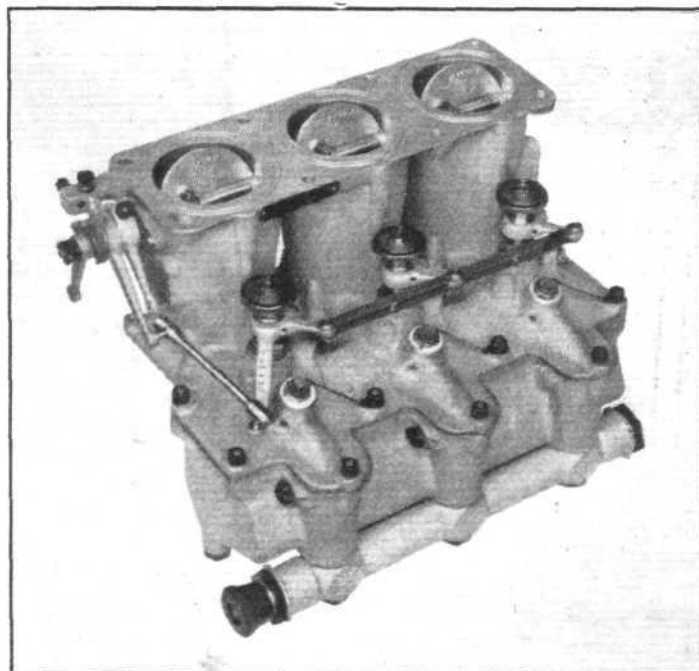


A sketch giving a part-sectioned view of the "Jupiter" induction spiral arrangement.

on a common spindle, and the crank on this is so arranged as to provide interconnection with the mixture control. Thus the altitude lever is automatically returned to the rich or ground position when the throttle is closed during a glide or dive, thereby preventing any possibility of the

engine being damaged by being run at ground level on the weak mixture setting used for altitude work.

For commercial aircraft, the main jet could, of course, be used not as a mixture-corrector for altitude flying, but as a



The Bristol "Triplex" Carburettor used on the "Jupiter" engines. This consists of three separate carburettors combined in one unit, operated by one set of controls, and requiring but one fuel feed pipe.

means of obtaining the most economical fuel consumption at cruising speed, and it is claimed that a saving in fuel of as much as 25 per cent. can be effected by this means.

(To be continued)

## AIRISMS FROM THE FOUR WINDS

### Sir Philip Sassoon's Cruise

IN the Blackburn "Iris" (Condors) flying boat Sir Philip Sassoon reached Malta on November 8 from Bengazi, on the North African coast. He met Maltese Ministers who wished to advance claims for Malta as a Mediterranean air base. The cruise was continued to Naples on November 9, Berne, November 12, and Hourtin air station, near Bordeaux, on November 12. Sir Philip arrived in London on November 13. The cruise covered 17,000 miles and 25 British air stations were visited in Egypt, Sudan, Mesopotamia, India and Malta. Eight days were spent in India.

### Australia-England Flight

THE Ryan monoplane "Spirit of Australia," which is attempting a return flight between Australia and England in a month, reached Batavia on November 6, and left for Victoria Point on November 7. Head winds and heavy rains were encountered off the Sumatra coast and the course was altered to Singapore, where the arrival was made in the afternoon. Mistaking the purport of a smoke signal the pilot landed at a wrong point near the racecourse and ran into golf bunkers, without, however, doing any damage to the monoplane. The crew are Capt. F. Hurley and Flying Officers Moir and Owen. Plans to cross India from Calcutta to Karachi in one hop were not possible owing to ground fog which delayed the start. A first stage of 700 miles to Agra was made, followed by a further stage of 750 miles to Karachi.

### Flight-Lieut. R. R. Bentley

ON November 11, Flight-Lieut. R. R. Bentley and his wife reached Khartoum in their D.H. "Moth" (Cirrus) in the course of a return flight to S. Africa, after many months sojourn in England. This will be the third flight that Flight-Lieut. Bentley has made between England and S. Africa, and in the same light aeroplane.

### Berlin-India on 20 h.p.

ON his own Klemm-Daimler (20 h.p.) monoplane Baron Keonig, a German pilot, flew from Berlin to Karachi via Russia, Turkey and Persia. He reached Karachi on November 6 and the only serious mishap during the whole flight was

when force-landing in the high Persian mountains owing to adverse winds. The Baron recently learned to fly and on purchasing the monoplane for £400 (the sale price) he determined to see how far he could fly. It is his intention to fly on to the Far East now.

### Aviation on the Pacific Coast

A READER, Mr. G. Rosekilly, now of Illinois, U.S.A., writing from San Leandro, California, on October 26, points out the lack of British enterprise in aviation along the Pacific coast. He had only seen an S.E.5 (180 h.p. Hispano) with two guns mounted, a D.H.9a (400 h.p. Liberty), and a D.H.9a camouflaged as a mail carrier. These were the sole British products observed by him. The first two were engaged in film work. There were apparently no new British machines or equipment at all, and no publicity of any kind.

### "Round Africa with Cobham"

A PRIVATE showing of the film "Round Africa with Cobham" was given at the "Astoria" on November 8. This film, which is the story—"told" in Sir Alan Cobham's own words—of the recent survey flight of some 20,000 miles round Africa made by Sir Alan is undoubtedly a very excellent one. Although lasting a little over an hour, interest never flags for an instant, and quite a good idea of the daily life and atmosphere on board the Short "Singapore" (Rolls-Royce "Condors") flying-boat is given in many parts. It is a good film in every aspect—as a flying picture, as a nature and geographical study, artistically, and, last but not least, as an Imperial propaganda film. We feel sure it will have a successful run.

### Sir William Horwood

SIR WILLIAM HORWOOD, late Commissioner of Metropolitan Police, is to be a member of the board of directors of the new motor track and aerodrome company at Portslade, near Brighton.

### "D.H." Aircraft in Canada

THE executive offices of the De Havilland Aircraft of Canada, Ltd., are now located at the Bay-Richmond Building, 372, Bay Street, Toronto, 2, where all communications should be addressed.

# MACHINERY INSTALLATION OF R.101

"It is machinery reliability which more than any other factor has limited the use of past airships. It is the use of petrol which . . . has constituted the greatest fire risk in connection with their use." With these two statements Wing-Comdr. T. R. Cave-Browne-Cave commenced his lecture to the joint meeting of the Royal Aeronautical Society and the Institution of Automobile Engineers on November 8, and in so doing he gave his *raison d'être* for the use of heavy fuel-oil engines and their installation in the new rigid airship, R.101, which is being erected at the Royal Airship Works at Cardington. Safety had, the lecturer said, been sought by the use of Beardmore heavy-oil engines, and reliability, although possibly prejudiced by the use of such new engines, had been sought in the design of the installation and in the preparations made for testing. Each engine was carried in a self-contained unit, which could be easily changed for another complete unit while the airship was at the mast. A unit could be mounted on a gantry and tested under conditions essentially similar to those obtaining during flight.

It had been hoped that the engines might have been available in time to allow a unit to undergo such thorough tests and development that by the time the airship itself was ready for flight the engines would cause no uncertainty in the mind of the captain. Owing to difficulties experienced with torsional resonance this hope had not been realised, but he submitted that the delay, although unfortunate, had not justified turning aside from what must be accepted as the safest system, and eventually, perhaps, the most economical also.

After describing the placing of the five power cars on R.101—a single car aft, on the centre line, to give slipstream on the rudder for approaching the mooring mast, and two pairs "outboard," ahead of and aft of the passengers' quarters respectively—the lecturer gave a brief outline of the design of the Beardmore "Tornado" engines.

Originally it was hoped that each engine would develop 700 b.h.p. at 1,000 r.p.m., but the engines were now to develop a continuous full power of 585 b.h.p., with a maximum of 650 b.h.p. The paramount merit of the engine was that it burned oil of such a high flashpoint that the fuel had to be heated to the temperature of boiling water before it would give off any inflammable vapour at all. The "Tornado" engines were of the eight-cylinder "in-line" type, with a bore of 8.25 in. and a stroke of 12 in. Such an engine gave a long crankshaft, which had been found to be subject to torsional vibration. Diagrams obtained with the torsio-graph showed a variation of plus and minus 30 times the mean torque at a speed of 950 r.p.m., but this was exaggerated by the instrument, and after improvements had been made half that variation was recorded. Maj. Carter had now evolved a formula whereby the dangerous resonant speed could be predicted from the drawings of the shaft. New shafts had now been designed which were so much stiffer that the major critical speed fell outside the normal running range, but it was not possible to keep clear of the minor critical speeds, and a damper flywheel was being fitted at the end farthest from the airscrew. Further, a spring coupling was being fitted between the shaft and the airscrew so calculated as to bring the major critical speed far below the normal running range. The method of fuel control was then explained. The consumption of the engine at its continuous full power was 0.385 lb. per b.h.p./hour. This was a saving of 30 per cent. as compared with the petrol engine, and, moreover, the consumption decreased slightly for a decrease in power. The engine weighed about 8 lbs. per h.p., but there was no reasonable doubt that this weight could be halved when the design had undergone refinements.

A 40-h.p. auxiliary engine started the main engines through a reduction gear of 20 : 1, and it had been found that less than 10 h.p. was required to run a main engine up to the 100-120 r.p.m. at which it started.

The lecturer then described the hub of the variable-pitch airscrews to be used, and which were capable of being turned about their axis so as to give ahead or astern thrust or to be in a neutral position. Hollow-steel blades were used in the tests, but owing to the abnormal torque fluctuations due to resonance it had now been decided to use solid alloy blades, the root strength of which could be greatly increased. To provide for proper support of the power cars it had been necessary to lead thrust wires to a bearing carried on the outer face of the airscrew hub.

Evaporative engine cooling was being used, and it was hoped ultimately to pass the steam from the separator to fabric duct condensers formed in the outer cover and so avoid extra drag. Until the ducts could be thoroughly tried out, however, triangular honeycomb radiators were being provided. The waste steam from the two amidships engines was led to a large retractable radiator, which could be drawn up into the discharge of the ventilating fan of the passengers' quarters.

Originally it had been intended to use waste steam for cooking, and a boiler evolved for this purpose was described, but it had now been decided to do the cooking by electricity.

A constant-speed windmill for driving auxiliaries when the air-speed was above 40 m.p.h. was described. The power developed by this windmill was 12 to 15 h.p.

The lubricating oil was carried in two shaped tanks in the car structure of each engine, thus avoiding the necessity for drawing oil from storage tanks in the hull. The larger of these tanks was fitted with a baffle, so that a comparatively small quantity of oil was in general circulation, and would, therefore, warm up quickly. The heat given to the oil was large in the "Tornado" engine, presumably because of the large surface of the crank-case kept at almost 100° C. by proximity to the cylinder jackets. The oil-wetted surface of the crank-case was, however, correspondingly large. Violent circulation of air through the crank-case was a very effective method of oil cooling. It was proposed to draw the whole of the induction air through the crank-case, and a satisfactory apparatus was made. Some doubt was raised as to the safety from fire, and as the risk could not be wholly disproved the system was abandoned in favour of the conventional Potts oil coolers.

Accessibility had been carefully studied, and the engineer in the power car was able to pass along the full length of both sides. It would be possible, in flight, to remove a cylinder head, piston and connecting rod.

The fuel storage system in the hull had not only to provide a supply of fuel to every engine car, but must make it possible to move large quantities fore and aft for trimming purposes. The storage tank unit was one of 224 gallons, with a clearance volume of 10 per cent. From the storage tanks the fuel drained by gravity to a transfer tank, from which it could be blown by compressed air to feed tanks situated above each engine car. At the bottom of each feed tank there was a steam box by which the oil could be heated to flow more easily to the engine car. The capacity of the fuel system was 29 tons, which left a considerable margin above the 22 tons required to reach Egypt in 40 hours at an airspeed of 76 m.p.h. against an average head wind of 15 m.p.h. Compressed air was also used for trimming water ballast.

Certain selected fuel tanks were fitted with special jettison valves which consisted in wells in the bottom, sealed by discs of 28-gauge aluminium. Cutters operated by hand and travelling around this disc, somewhat after the style of the familiar tobacco tin opener, cut away the disc, and the fuel issued as a smooth stream of 12 in. diameter, which did not break up until well below the level of the airship.

The fuel pipes in the hull totalled a length of over 1,500 ft., and the water pipes over 500 ft. There were over 100 cocks, and the cocks and pipe joints had presented some difficulty. A development of the "olive" joint had been adopted, in which duralumin flanges with bolts took the place of screwed nipples.

For a commercial airship it did not appear economically sound to fit water recovery apparatus solely for reducing the quantity of hydrogen that must be replaced after each voyage. If the surplus of hydrogen could be burnt as fuel it would reduce the quantity of oil carried and made water recovery easier from the engines in which it was burnt, and apparatus of reasonable size was likely to be satisfactory.

Experiments made had shown that hydrogen introduced with the air could be burnt with fuel oil in so high a proportion that all the gas which became available from the use of oil in five engines could be burnt, with oil, in two engines. This would effect a saving of about 20 per cent. of the total oil required for a given power. This was convenient, because only two engines need be fitted with recovery apparatus.

Wing-Commander Cave-Browne-Cave concluded by giving a demonstration of the non-inflammable nature of the heavy-oil fuel. A quantity of petrol was poured into a vessel and ignited. Some of the fuel oil was then poured on the burning petrol and extinguished the fire!



## PRIVATE



## FLYING

A Section of FLIGHT in the Interests of the Private Owner, Owner-Pilot, and Club Member

## THE HOUSEHOLD BRIGADE FLYING CLUB "AT HOME"

WHAT promised to be a very successful informal flying function was unfortunately marred by a tragedy on Friday of last week, when the newly-formed Household Brigade Flying Club held an "at home" at Brooklands aerodrome. Just before the proceedings opened at 2 p.m., and while some half-a-dozen aeroplanes were arriving overhead, Lieut. G. H. B. Madocks, of the Coldstream Guards—a member of the Club—crashed in his S.E.5a and was fatally injured.

Lieut. Madocks was just coming into the aerodrome, near the Hawker Engineering Co.'s sheds, at about 800 ft., and executed an Immelman, followed by some spins. After two spins all thought he would flatten out, but to the horror of onlookers, the machine continued for two more, and although the pilot was apparently then proceeding to flatten out, it was too late; the machine crashed into the ground, practically head on.

Assistance was at hand in a few seconds, and the unfortunate pilot was extricated—not without some difficulty—terribly injured, and he only lived for a few minutes. The S.E.5a was a total wreck. It was a sad beginning to the Club's first meeting, for not only was Lieut. Madocks an active and popular member, but a large gathering of visitors and aircraft had already assembled for an excellent little programme of flying that had been arranged.

Lieut. Madocks learned to fly at Col. Henderson's School at Brooklands, and took his "ticket" (No. 8113) on June 29,

1927. He had registered his S.E.5a (R.A.F. engine) 'QQ' as far back as April 4, 1927. He was the son of Brig.-Gen. W. R. N. Madocks, C.B., C.M.G., D.S.O., R.F.A., who had the misfortune to lose his other son, Mr. Kenneth Madocks, last April, as the result of a motor-car accident in France.

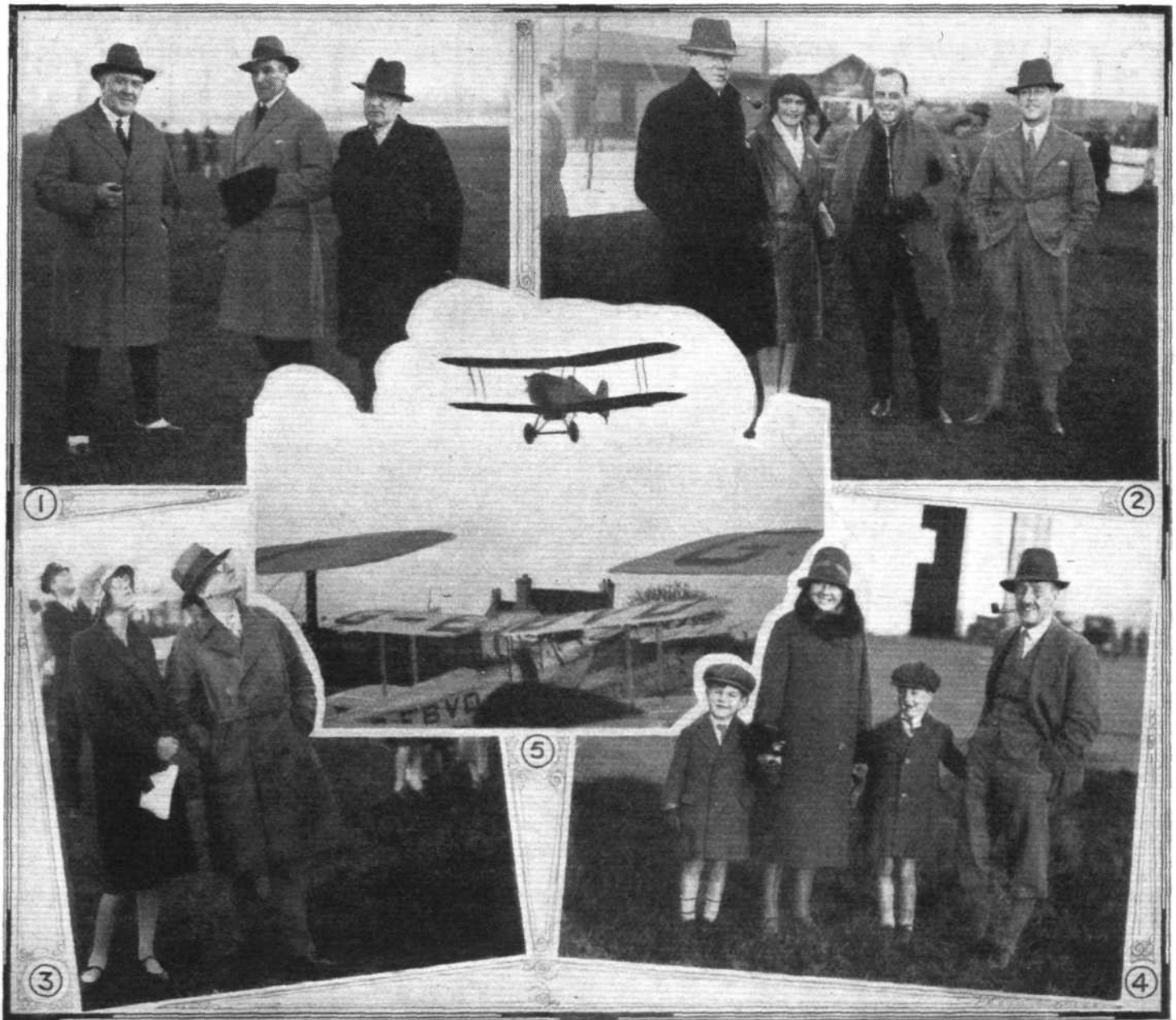
Naturally, the regrettable accident put an end to the proceedings so far as carrying out the full programme was concerned. Nevertheless, a number of machines went up, while others continued to arrive during the afternoon. Altogether, well over 30 machines of various types were present, including three Service "Atlas" Co-Ops. from No. 13 Squadron, R.A.F., D.H. "Moths" ("Cirrus," "Genet" and "Gipsy"), two D.H. 53's (Bristol "Cherub"), Avro "Avian" and "504's" ("Mono," "Le Rhone," and "Renault"), a Blackburn "Bluebird," a Simmonds "Spartan," and some S.E.5a's—including the "D.W.1" 'OG', which has been specially rebuilt for racing by Mr. D. A. N. Watt.

The latter, by the way, put up a thrilling exhibition of fast and stunt flying during the afternoon, showing that "D.W.1" has a pretty good turn of speed. Another interesting exhibition of flying was that given by an unknown (to us) pilot on the Avro 504 K ("Mono") G-AACA—the pilot for this machine according to the programme was Mr. May, but we cannot be certain if he gave the demonstration in question, for we were unable to obtain a "close-up" when the machine ascended and landed. Anyway, whoever he was, he "slotted"



[ "FLIGHT" Photographs ]

HOUSEHOLD BRIGADE FLYING CLUB "AT HOME"; Some of the thirty-odd machines gathered at Brooklands last Friday. At the top are the civil machines, while below are three Service "Atlas" Co-Ops. from No. 13 Squadron, R.A.F.



["FLIGHT" Photographs

**HOUSEHOLD BRIGADE FLYING CLUB "ATHOME":** Some Personalities at Brooklands.—(1) Lt.-Col. Charles Jarrott (left), Lt.-Commr. Montague Grahame-White, and Capt. Lynch-Blosse. (2) (Left to right) Mr. A. Russell, President of the Reading Ae. Club, and Miss L. Cribb, its Secretary; Capt. E. W. Percival and Mr. A. C. M. Jackaman. (3) Miss L. Hope and Don J. de la Cierva watching Mr. D. A. N. Watt (5) on his D.W.1. (4) *En famille*, Flt.-Lieut. P. W. S. Bulman, with Mrs. Bulman, Paul and Duncan.

without a slot, and "Autogired" without a windmill in a remarkable fashion. A number of passengers were also taken up for joy rides in various machines.

Amongst the "guests" we noticed a number of well-known personalities of the aviation world. Of course, one of these was the energetic D. of C.A., Sir Sefton Branker. Of the pilots present we spotted Miss Spooner, Capt. S. Burt, Mr. A. C. M. Jackaman, Mr. Malcolm, Mr. Ivor McClure, Capt.

Percival, and a great many others whose faces were familiar, but whose names were elusive.

Altogether, except for the unhappy opening, the "At Home" was a very successful affair, because even if the programme was not carried out as planned, the occasion showed indications that the Household Brigade Flying Club is going to be a very live and big one. We hope to have something more to say about it in a future issue of *FLIGHT*.

#### Norwich Aero Club Ball

THE annual ball of the Norfolk and Norwich Aero Club held on November 9, at the Arlington Rooms, Norwich, was a success. The club had to refuse nearly 200 applications for tickets, 300 being the comfortable capacity for the Arlington Rooms. The ballroom was suitably decorated with propellers, aeroplane pictures, and models, while the sitting-out rooms were tastefully decorated with plants and ferns. During the evening an excellent cabaret entertainment was provided. This proved a most popular feature. Supper was served in the Tapestry Room by Prince's. Amongst those present were the Lord Mayor of Norwich (Mr. H. P. Gowen) and the Lady Mayoress, Mr. H. N. Holmes (president of the club), Mr. A. A. Rice (chairman) and Flight-Lieut. Webster.

Sir Sefton Branker, Director of Civil Aviation, wrote apologising for his inability to attend. Parties were brought by Capt. Harmer, Mr. J. Hardy, Capt. H. J. Cator, Capt. Dawson Paul, and Mr. J. Read. The success of the ball reflected great credit on the committee who had worked under the chairmanship of Mrs. H. J. Cator, with Mr. J. Morse as secretary. Dancing was continued until 2 o'clock.

#### New Instructor for Scottish Flying Club

FLIGHT-LIEUT. WILLIAM JONES has resigned his position as chief instructor to the Scottish Flying Club. He has been succeeded by Capt. Robert Stirling, who was pilot instructor to the Beardmore Flying School, Renfrew, which has now closed down.



## AERODROME SCHEMES

THE reports which reach us from all directions in this country show the practical interest which the Air Ministry has raised on the aerodrome question by the despatch of its communicative quarter it has been received as intended, that is, as a direct and sincere appeal on behalf of an urgent question, and it has met with a courteous reception. Council meetings have followed almost immediately and the project discussed optimistically and, we think, to some rapid purpose. The immediate attitude has been one of almost entire acquiescence. There now remains merely practical investigations by appointed committees for the scheme to formulate on a wide scale.

Essentially the financial aspect has loomed foremost almost at once and introduced a guarded note to the proceedings. But it does not seem that a barrier will arise over this, although there may be a few exceptions.

**Manchester** offers a useful example of how insignificant the financial question can be to a town, given certain natural possessions, such as a suitable site at hand. It is estimated that the chosen site for Manchester at Chat Moss, about 7 miles from the city, and 260 acres in extent, will need no more outlay than a paltry £100 to make it adaptable as a landing field. The primary expense will be merely that entailed in clearing fences. It cannot be emphasised too often that the preliminary measure desired of municipal authorities is the allocation of an adequate area. They are not asked to make Croydons.

Accepting these limits, it is reasonable to suppose that many towns can do as much as Manchester is doing at a similar negligible expense. Aerodromes in the complete sense can be left to develop as air traffic brings in revenue to ease that development.

Incidentally, one can surmise that any town which provides a site would inevitably attract to itself a flying club, for the ground would be an appreciable part of the battle in the formation of such a club.

To revert to Manchester, which is now considered to possess the first municipal aerodrome in the country (although many other towns have long since taken a sort of option on sites for the same purpose), one of the town's ambitions is to have a direct air service with the Continent and not merely remain satisfied with a linking up with Croydon. The Air Ministry has sanctioned the use of the chosen field.

**Sheffield** will possibly respond to the Air Ministry's appeal by renewing its powers to acquire compulsorily the Coal Ashton aerodrome which many local people thought should have been purchased some years ago. Huts and workshops which were used when the aerodrome was active

have been partly demolished, which is no loss, because after 10 years they would not be suitable for the demands of a modern aerodrome.

The actual landing field is intact.

**Edinburgh Town Council** is to examine this national scheme as it applies locally. The local press does not strike that note of spontaneous enthusiasm which is evidenced nearly everywhere else. It requests that investigation should be marked by caution; it takes care to point out that it thinks time will elapse before an aerodrome will pay for itself. It also thinks that because Edinburgh must some day have its aerodrome it does not follow that it must be maintained by the municipality. It hints that the burden could possibly be taken up by private enterprise, and although it expresses a desire not to throw cold water on the project, it suggests that the Corporation could at least make diligent inquiry into the matter of sites and lay complete plans, so that it could act promptly and smoothly if the scheme was some day approved.

This attitude makes it clear that the fact that aerodromes must precede air traffic has not been visualised, but it does not really count, because, as far as we are aware at the moment, it is not the attitude of the Edinburgh Town Council.

**Nottingham Corporation** is to apply to Parliament in its next Bill for powers to establish a municipal aerodrome.

**Birmingham** has 14,000 acres of land out of 50,000 acres devoted to industrial expansion which it is anxious to develop, and it is hinted that an aerodrome may be involved.

**Hull Chamber of Commerce** has discussed the facilities of that city for land and sea air traffic. A seaplane or flying-boat service across the North Sea has been mooted as it would offer advantages to industrial towns like Sheffield. The sea journey, from Hull to Hamburg, for instance, takes 48 hours, whereas the distance would only take 4 hours by air transport. Letters have been addressed to various chambers of commerce seeking support. The President of the Hull Chamber of Commerce (Major A. J. Atkinson) stated that the operation of the service with three flying-boats and a machine in reserve would involve a capital of £124,000, and its initial success would depend on the establishment of an air mail service.

For **Reading**, 130 acres of land have been purchased by Messrs. Phillips and Powis about 2 miles from the town, and the Air Ministry has approved of the site as an aerodrome. Work on the hangars will start shortly and early next year one may possibly see the aerodrome in full use, or at least in readiness. One believes it will also be used by the new Berks, Bucks and Oxon Aeroplane Club.

## LIGHT 'PLANE CLUBS

**London Aeroplane Club**, Stag Lane, Edgware. Sec., H. E. Perrin, 3, Clifford Street, London, W.1.  
**Bristol and Wessex Aeroplane Club**, Filton, Gloucester. Secretary, Major G. S. Cooper, Filton Aerodrome, Patchway.  
**Cinque Ports Flying Club**, Lympne, Hythe. Hon. Secretary, R. Dallas Brett, 114, High Street, Hythe, Kent.  
**Hampshire Aero Club**, Hamble, Southampton. Secretary, H. J. Harrington, Hamble, Southampton.  
**Lancashire Aero Club**, Woodford, Lancs. Secretary, F. W. Atherton, Woodford Aerodrome, Cheshire.  
**Liverpool and District Aero Club**, Hooton, Cheshire. Hon. Secretary, Capt. Ellis, Hooton Aerodrome.  
**Midland Aero Club**, Castle Bromwich, Birmingham. Secretary, Major Gilbert Dennison, 22, Villa Road, Handsworth, Birmingham.

**Newcastle-on-Tyne Aero Club**, Cramlington, Northumberland. Secretary, J. T. Dodds, Cramlington Aerodrome, Northumberland.  
**Norfolk and Norwich Aero Club**, Mousehold, Norwich. Secretary, G. McEwen, The Aerodrome, Mousehold, Norwich.  
**Nottingham Aero Club**, Hucknall, Nottingham. Hon. Secretary, Cecil R. Sands, A.C.A., Imperial Buildings, Victoria St., Nottingham.  
**The Scottish Flying Club**, 101, St. Vincent Street, Glasgow. Secretary, Harry W. Smith.  
**Southern Aero Club**, Shoreham, Sussex. Secretary, C. A. Boucher, Shoreham Aerodrome, Sussex.  
**Suffolk Aeroplane Club**, Ipswich. Secretary, Maj. P. L. Holmes, The Aerodrome, Hadleigh, Suffolk.  
**Yorkshire Aeroplane Club**, Sherburn-in-Elmet, Yorks. Secretary, Lieut.-Col. Walker, The Aerodrome, Sherburn-in-Elmet.

### LONDON AEROPLANE CLUB

REPORT for week ending November 10.—Pilot instructors: V. H. Baker and F. R. Matthews. Ground engineer: C. Humphreys. Aircraft: The following machines were in commission during the week: G-EBNY, G-EBMP, G-EBXS. Total flying time for the week: 26 hrs. 10 mins.  
 Dual instruction: 25 members were given dual instruction during the week, the flying time being 15 hrs. 15 mins.  
 Solo flying: 16 members made solo flights during the week, the time being 10 hrs. 55 mins.

Christmas raffle.—It has been decided to raffle one of the club D.H. Moths, "Cirrus Mark I," complete with C. of A. Tickets, 10s. each. We shall be glad to supply any club or R.A.F. Mess with tickets for sale amongst its members. Tickets will be issued in books of 10. The draw will take place during the second week in January, 1929, or earlier, if the tickets are disposed of before the end of the year.

Shed accommodation.—The new hangar for the accommodation of the club aircraft is now nearing completion, and should be ready within the next fortnight.

Members' Rooms.—The club rooms for the use of members will be built immediately in front of the club hangar with all windows facing the aerodrome. It is hoped to be in occupation of these rooms before Christmas.

### BRISTOL & WESSEX AEROPLANE CLUB, LTD.

REPORT for the week ending Saturday, November 10.—Pilot instructor: E. B. W. Bartlett. Ground engineer: A. W. Webb. Machines in commission: (2) G-EBYH, G-EBTV. Flying time for the week: 8 hrs. 5 mins. Pupils under instruction and hours flown: (6) 4 hrs. 35 mins. Soloists under instruction and hours flown: (1) 5 mins. Number of "A" pilots flying and hours flown: (4) 1 hr. 55 mins. Number of passengers carried and hours flown: (3) 45 mins. Number of test flights and hours flown: (6) 45 mins.

There is very little of interest to report. Members have taken full advantage of the few bright intervals, and we record Mr. Rogers's first solo, which he negotiated well and shows promise of an early "A" licence. Miss Massingham and Mr. Pratten did their first flights. The Hon. C. Dutton with Mr. Bartlett did a two-hour flight to Sherborne and back.

### CINQUE PORTS FLYING CLUB

REPORT for week ending Saturday, November 10.—Pilot instructor: Maj. H. G. Travers, D.S.C. Ground engineer: Mr. R. H. Wynne. Machines: de H.60 Moths G-EBNN and G-EBYJ. Total time for week: 13 hrs. 30 mins. Dual instruction: Mr. Worsell, 1 hr. 15 mins.; Mr. Swinnard, 15 mins.; Mr. Sargent, 2 hrs.; Mr. Law, 4 hrs. 15 mins.; Mr. Somerset, 45 mins.

Mr. Martin, 15 mins. Six members. Total, 8 hrs. 45 mins. Soloists under instruction: Mr. Sargent, 30 mins.; Mr. Law, 3 hrs. 10 mins.; Mr. Somerset, 15 mins.; Mr. Martin, 15 mins. Four members. Total, 4 hrs. 10 mins. "A" pilot: Mr. R. Dallas Brett, 15 mins. Joyride: One, 10 mins. Tests: One, 10 mins.

The weather was much kinder and the club achieved a most satisfactory week's work. Three first solos, an "A" licence, and the airframes still intact.

On Monday, November 5, Messrs. Sargent and Law accomplished very excellent first solos.

On Friday, November 9, Maj. Travers and Mr. Law flew Y.J. to Brooklands Club to attend the opening meeting of the Household Brigade Flying, with which this club recently entered into a working agreement.

On Saturday, November 10, Mr. Law, a London member, successfully passed his tests for "A" licence. He put up a very fine performance under difficult weather conditions. His landing after his figures of eight was a model.

Later in the afternoon, Mr. Somerset of the Guards Depot, Canterbury, was sent solo. His first approach and landing were so good that the spectators thought they might have been just lucky, but he took off again immediately and repeated the performance exactly. If all first solos were as polished as Mr. Somerset's, insurance rates would come down with a bump. The club congratulates Messrs. Law, Sargent and Somerset on excellent performances and Maj. Travers for achieving the results. Altogether a very good week.

## HAMPSHIRE AEROPLANE CLUB

REPORT for week ending November 10.—Pilot instructors: F./Lt. F. A. Swoffer, M.B.E., and Mr. W. H. Dudley. Ground Engineers: Mr. E. Lenny and Mr. J. Elliott. Aircraft: D.H. 60 Moths, G-EBOI and G-EBOH. Flying time for the week: 39 hrs. 35 mins. Pupils under instruction (29): 25 hrs. 15 mins. Soloists (5): 5 hrs. 25 mins. "A" pilots (12): 6 hrs. 20 mins. Passengers (2): 1 hr. 15 mins. Tests (10): 2 hrs. 35 mins.

Miss Home has now completed the tests for her "A" licence. Messrs. Angus, Storey and Thorn achieved successful first solos.

## LIVERPOOL & DISTRICT AERO CLUB

REPORT for week ending November 10.—Machines in commission: XX, XY, WK, Avro-Avians. Instructor: Mr. J. B. Allen. Ground engineer: Mr. H. Pixton. Total hours flown: 10 hrs. 35 mins. Thirteen pupils flew a total of 8 hrs. 15 mins. Four soloists totalled 35 mins. Two "A" pilots totalled 40 mins. One passenger flight, 15 mins. Tests: 10 flights total 50 mins.

Bad weather has been the order of the week, but Capt. Marstrand took advantage of a fine interval on Thursday, and put up a very creditable first solo. When Mr. Greenhalgh was flying XX the rocker arm bracket seating fractured and parted company with the cylinder head. Mr. Greenhalgh made a clever forced landing on the aerodrome. On Wednesday Mr. Thornton "did an arrival" and Mr. Pixton had the machine flying the next day.

A blue tit which has been living rent free in our hangar has taken a sudden dislike to XX and pecks holes in the wings industriously, the big bully! One realises that this sounds a bit tall, but there it is, and teetotal members have also seen the bird at work.

## MIDLAND AERO CLUB

REPORT for week ending November 10.—Total flying time, 19 hrs. 26 mins. Dual, 5 hrs. 50 mins. Solo, 7 hrs. 20 mins. Passenger, 4 hrs. 45 mins. Test, 1 hr. 31 mins.

The following members were given dual instruction by Flight-Lieut. T. Rose, D.F.C., and Mr. W. H. Sutcliffe: F. D. Scott, H. Coleman, T. W. Wild, J. K. Morton, L. H. Lee, C. T. Davis, M. Blakeway, M. C. Wilks, W. J. Halland, Maj. D. Thompson, Capt. J. C. Chaytor.

"A" pilots: R. D. Bednell, S. H. Smith, E. R. King, R. L. Jackson, M. A. Murtagh, C. W. Fellows, S. Duckitt, G. V. Perry, G. Robson.

Soloists: J. K. Morton, F. D. Scott, M. Blakeway, M. C. Wilks, J. C. Chaytor.

Passengers: J. K. Morton, C. W. R. Gleeson, T. C. Skinner, A. G. Hurrell, Miss J. M. Davis.

Very bad weather again restricted flying.

## NEWCASTLE-UPON-TYNE AERO CLUB

REPORT for week ending November 11.—Pilot instructor: G. M. S. Kemp. Ground engineer: K. C. Brown: assistant, G. E. J. Tait. Machines: (3) PT, QV and LX. Flying time: 16 hrs. Instruction: (12) 9 hrs. 30 mins. "A" pilots: (8) 5 hrs. 25 mins. Passengers: (5) 50 mins. Test: (1) 15 mins.

We were pleased to have QV on service again after a complete overhaul, but during the last week the weather has again let us down, more especially this week-end, when it was only possible to complete six hours' flying in three days.

Our new instructor, who comes from the south, has had quite a lot to say about our north-country weather, but we are hoping for an improvement to enable some of our members to go for their "A" tests.

The club is holding its fifth annual dance in Newcastle on Friday, the 16th inst., and offers a welcome to any aero. club members who happen to be in this district on this occasion.

## NORFOLK & NORWICH AERO CLUB

REPORT for week ending November 10.—Total flying time for week: 3 hrs. 10 mins. Dual: L. Morter. Solo: R. W. Moore, L. W. Lowen, N. Brett.

Thick fog prevented all flying for two days this week and the remainder of the time was either wet, damp, or so thoroughly unpleasant that members did not put in an appearance for flying. On Friday Mr. Young collected the Avian from Manchester, where she has undergone extensive repairs. We are now, therefore, complete with three machines again.

The annual ball took place on Friday and was crowded to the fullest capacity of the Arlington Rooms. Over 200 people who applied for tickets had to be refused owing to space. Three hundred people attended and a very excellent evening was spent, dancing proceeding until the small hours. The club was closed on Sunday, Armistice Day.

## SUFFOLK & EASTERN COUNTIES AEROPLANE CLUB

REPORT for week ending November 10th.—Instructor: G. E. Lowdell A.F.M. Ground engineers: "C," E. Mayhew, and "A," G. Keeley. Two Blackburn "Bluebirds," RE and EH. Flying time: 14 hrs. 55 mins. Nine members were given dual instruction (9 hrs. 40 mins.). Three members flew solo under instruction (2 hrs. 5 mins.). Flights were made by one



[ "FLIGHT" Photograph

A PRIVATE OWNER: Capt. Stewart Burt, with his D.H. "Moth X"

"B" licence member (35 mins.), and by three "A" licence members (45 mins.). Twelve passengers were carried (1 hr.). Ten tests were made (50 mins.).

Mrs. Young carried out a very successful first solo during the week. Mr. H. Billington and Mr. Lowdell flew to Brooklands on Friday in UH, to represent the club at the "At Home" of the Household Brigade Flying Club, the secretary of the latter club being also one of our members who, it may be recalled, entered one of our "Bluebirds" in the race for the King's Cup this year. We offer our deepest sympathy to the Household Brigade Club for the regrettable accident to Mr. Madocks at their meeting.

There is little to report this week except rain and fog. We had a visit from Mr. Overbury, a member of the Hampshire Club, who has just returned from Canada, where he has been carrying out forest fire patrols on a "Moth" seaplane. He joined the club as a temporary member and performed on the "Bluebird." Fortunately our member was away that day, as we are sure he would have been much annoyed to see his machines being used by someone else.

## YORKSHIRE AEROPLANE CLUB

REPORT for week ending November 10.—Pilot instructor, G. R. Beck. Ground engineer, R. Morris. Machines in Commission, three (RF, SV, TB.) Flying time for the week, 7 hrs. 5 mins. Instruction, (3), 40 mins. "A" pilots (5), 4 hrs. 55 mins. Passengers (5), 55 mins. Test flights (5), 35 mins.

We regret to announce that Mr. T. Houghton, our assistant ground engineer for the past eighteen months, has been obliged to leave the service of the club owing to the reduction of staff for the winter months. He has now taken up employment with the Blackburn Aeroplane Company at Brough, and we all wish him every success.

We take great pleasure in congratulating Mr. Ivo Thomson on obtaining his "B" licence. Mr. Thomson is the first "ab initio" "B" licence pilot of the club, and since he joined in May, 1927, has put in 170 hours.

We have had two visits this week from Captain T. A. Gladstone who called in his "Bluebird" on his way to London.

One of our members, Mr. Geoffrey Clapham, is proceeding to Bolivia at an early date to take up a flying appointment with the Bolivian Government. We all wish him the very best of luck.

## FROM THE FLYING SCHOOLS

Brooklands School of Flying, Ltd.

REPORT, week ending November 11.—Instructors, Captain H. D. Davis, A.F.C., Major Pickthorn. Ground engineers, W. A. Watts, W. B. Baker, W. H. Hellon. Machines in commission, G-EBVE, G-EBWJ. Flying time, 4 hrs. 20 mins. Pupils under instruction, 7. Soloists, 2. "A" pilots, 2.

This is the first week since the change-over from the Henderson Flying School and flying was stopped from last Monday to Friday to get the machines reconditioned and painted with new colours. The machines were wheeled out of their sheds on Friday for the first time during the week—hence the small number of hours flown.

The De Havilland Flying School, Stag Lane Aerodrome

REPORT for week ending November 11, 1928.—Total flying time, 71 hrs. 55 mins. Instruction, dual, 13 hrs. 50 mins.; solo, 21 hrs. 35 mins.; other flying, 36 hrs. 30 mins.

Amongst new pupils we welcome Mr. J. Scott-Taggart, the well-known wireless authority and Mr. G. E. T. Eyston, the famous racing motorist. Our congratulations are extended to Mr. P. M. Kabali, who despite many difficulties put up a fine show on his first solo flight.

Stag Lane Aerodrome is becoming more cosmopolitan than ever. On Friday, Danish, Belgian and Spanish "Gipsy Moths" left in formation to clear the customs at Lympne, whilst machines belonging to American, Czechoslovakian and Chilean pilots are housed in the "Stag Lane Aircraft Garage."

Fifteen new "Gipsy Moths" were tested and despatched during the week.



# ROYAL AUSTRALIAN AIR FORCE

Report by Air Marshal Sir J. Salmond, K.C.B.

THE report by Sir John Salmond, K.C.B., C.M.G., C.V.O., D.S.O., on the organization, administration, training, and general policy of development of the Royal Australian Air Force (Part I) has been published under the date, Melbourne, September 20, 1928. The report covers the following terms of reference:—(1) The present equipment and training policy of the R.A.A.F.; (2) the organization, administration, and general policy of development of the R.A.A.F.; (3) the employment of the R.A.A.F. in the defence of the Commonwealth.

In his introduction, Sir John Salmond remarks that the defects which he has pointed out were largely due to the immense difficulties of building up an air force in its initial stages without any properly established organization or bases. The force, he says, is established on a firm basis and has been developed along sound lines, and he gives credit to those responsible for the great work achieved in bringing it to its present stage.

Sir John inspected all the R.A.A.F. establishments, as follows:—No. 1 Flying Training School, Point Cook, Victoria; No. 1 Aircraft Depot, Laverton, Victoria; No. 1 Squadron, Laverton; No. 3 Squadron, Richmond, N.S.W.; Experimental Section, Randwick, N.S.W.; No. 1 Fleet Co-operation Flight, Bowen, Queensland.

He noticed that Nos. 1 and 3 Squadrons are composed up to two-thirds of Citizen Force personnel, whereas the remainder of the units are in the main composed of permanent air force personnel; that No. 101 Fleet Co-operation Flight has had no experience in operating from a carrier with the fleet; that Nos. 1 and 3 Citizen Air Force Squadrons are the only operational units designed to undertake hostilities in conjunction with the army; and that the period of compulsory training for C.A.F. personnel is 25 days. He then remarks "Due to the obsolete type of service machines in use throughout the air force, to the entire absence of any reserve equipment, and to the low standard of training in these operational units, I have to report that I consider that the R.A.A.F. would be totally unfit to undertake war operation in co-operation with the navy or army, even after the permissible period of training for the latter had elapsed."

## Operational Units

After emphasizing the need of the highest skill in the handling of aircraft, Sir John remarks that skill in air fighting, in navigating, bombing, and in co-operation with other arms can be attained only by constant training in a permanent unit. It cannot be reached by units composed chiefly of C.A.F. personnel doing 25 days' training a year. He recognises the policy of the Commonwealth to maintain defence units on a citizen force basis, which is economical, and therefore, has recommended the establishment of both permanent and C.A.F. operational units.

The two operational C.A.F. squadrons for work with the army are organised each in three flights, each flight with a different type of machine and each intended to fulfil a different rôle, namely, army co-operation, fighting, and bombing. Arising from this are difficulties in maintenance and training, and supply from the base is uneconomical. It is recommended that these and future C.A.F. squadrons should be confined to one type of service machine and one rôle, namely, bombing; and permanent units are recommended to take over the duties of fighting and army co-operation.

## Training

Training, it is remarked, is so interlocked with equipment that it is not possible to judge the one without reference to the other. The present standard of training, Sir John considers, is too low. He then proceeds to discuss No. 1 F.T.S. at Point Cook. He says that officers who pass out from it are very well trained in flying and have reached a sufficiently high standard to profit by further practice and training with their units. This has been denied them on account of the insufficiency and inadequacy of the aircraft available. Practical training in air gunnery, air pilotage, bombing, photography, and navy and army co-operation does not exist, and theoretical training in these subjects is elementary. The training course for permanent short service commission officers and airmen pilots is eight months, and for citizen force officers four months. Sir John recommends that the school be re-organised. The course should be extended to 12 months,

while C.A.F. officers should no longer be sent there. The latter will be trained at the squadron most convenient. Hitherto the C.A.F. officers have mostly been University students who trained during their vacation. The new arrangement will make it practicable to select other volunteers in the district for training. For future permanent operational units, it is recommended that the syllabus of training for similar units in the Royal Air Force should be adopted.

## Equipment and Supply

With the exception of a few machines recently purchased, aircraft and engines were found to be old and for the most part out of date and unserviceable. The replacement of this equipment is overdue, and the efficiency of the force has suffered severely in consequence. Efforts to recondition this old equipment by commercial firms have not always proved successful, partly due to the initial inexperience of the contractors, and partly because the orders were too small and irregular to justify the outlay for jigs, tools, etc. A very large proportion of the spares have to be obtained from Great Britain, and so it is necessary to forecast requirements much earlier than would be necessary if these supplies were available locally.

The supply staff was found to have been labouring under great difficulty. Living largely on the gift equipment, it has not yet been possible to estimate accurately the normal consumption and wastage. The Stores Depot at Laverton was established only some 18 months ago, and stocktaking had not yet reached finality. There was a large quantity of out-of-date stores which should be got rid of. The vocabulary of the stores needed much revision. The Directorate of Supply should have more extensive powers of control over local purchase. No data exist on which a reliable estimate of the cost of future units can be based. Until further progress is made towards clearing the accountability for supplies from the undoubted confusion in which it is at present, a considered policy to meet present and future requirements cannot, says Sir John, be expected.

## Personnel

Officers of the Permanent [it would have avoided some confusion if the word Regular had been used, as Short Service and Permanent are contradictory terms.—*Ed.*] Air Force (General List) hold either permanent or short-service commissions in the R.A.A.F. or are seconded from the Navy or Army for three years. Short-service commission officers serve for four years on the active list and four years on the reserve. C.A.F. officers, whether volunteers or men liable under the Defence Act, serve for eight years, four of which may be on the reserve. Officers with permanent commissions are drawn from (a) regular officers of the Navy and Army who have transferred to the R.A.A.F. after secondment, (b) suitable short-service commission officers, (c) cadets from the Royal Military College who are nominated or have volunteered for the R.A.A.F. Sir John points out that (a) is inconvenient to the parent service and nullifies the advantages of secondment; (b) nullifies the advantages of the short-service commission system, and (c) is a partial waste of training as cadets for the Army.

He proposes the formation of a R.A.A.F. Wing at the Royal Military College, Duntroon, at which cadets would remain for three years, gradually specialising more and more on air force subjects. In the second and third years they would be taught to fly in the training flight of the proposed permanent army co-operation squadron at Canberra. It is expected that six entries per annum, in addition to the supply from other sources, will be sufficient for the immediate requirements of the force. Officers from Duntroon will also supply the units working with the fleet after a course of training, and at present it will not be necessary to make provision at the Royal Naval College, Jervis Bay. As the air force develops, Sir John says that it may be necessary to establish a separate R.A.A.F. cadet college.

The continuance of the system of short service commissions is recommended.

Sir John approves the period of four years on the active list for Citizen Air Force officers, but expects that under his proposed new training scheme candidates for commissions will not be limited to compulsory trainees from the

Universities, but that advantage may be taken of the work of the flying clubs.

Sir John directs attention to the voluntary retirement in the past two years of 10 permanent officers and 136 airmen. All the officers were flying instructors. Coming on top of normal wastage in personnel he considers the number excessive for a small force, and suggests some improvements in conditions of service. These include revision of the rules of the Superannuation Fund and gratuities, increased leave per annum for officers, revision of allowances regulations, revision of the pay of other ranks, and placing the C.A.F. officers on the same footing as permanent officers in the matter of accident benefits.

### Establishments

The Experimental Establishment at Randwick, N.S.W., appears to have cost the Government £25,000 during the past year. The skilled work carried out has been of a high order, and two amphibian "Widgeons" and one experimental training type, the "Warrigal," have been built there. If the object was to prove that it is possible to build machines almost entirely from material obtained in Australia, that object, says Sir John, has been attained. If the object was, after having built them, to put them to the trade for production, he can find no authority in any correspondence for such a policy. Such a policy would be the only justification for maintaining Randwick and, failing that, he recommends that it be closed down.

### Programme of Development

Sir John points out that on account of the vast extent of Australia it is impossible to be strong at all points simultaneously, but that an air force by virtue of its mobility, is able to protect widely separated localities. He recommends, therefore, that the following new units be established and completely equipped within nine years, *i.e.*, by 1938:—

One Squadron—Army Co-operation (including one training flight) at Canberra.

One Flight—Single-seater Fighters at Point Cook, Victoria.

One Flight—(Boats) Coastal Reconnaissance at Lake Macquarie, N.S.W.

One Flight—(Boats) Coastal Reconnaissance at Point Cook:

One Squadron—Bomber Reconnaissance at Richmond, N.S.W.

One Squadron—Bomber Reconnaissance at Laverton, Victoria.

One Flight—Single-seater Fighters, at Richmond.

One Stores Depot, A.R.S., and E.R.S., at Richmond.

One Recruits' Training Section at Laverton.

One Wing Headquarters at Richmond.

One R.A.A.F. Cadet Wing, Royal Military College, Duntroon.

All the above units to be on a permanent basis; and, in addition:—

One Bombing Squadron, Citizen Air Force, at Perth, W.A.

Three slipways with facilities for operating a flight of flying boats at Albany (W.A.), Brisbane and Darwin.

[It is obvious that the existing Nos. 1 and 3 Squadrons are to be retained as bombing squadrons of the C.A.F.—Ed.]

The army co-operation squadron at Canberra will, it is pointed out, be located centrally, between the two main areas of army concentration, and will also be beside the military college at Duntroon. The bomber-reconnaissance squadrons at Richmond and Laverton, besides forming the natural complement of air forces working with the army, will be available for coast defence—especially when the torpedo-bomber aeroplane is fully developed. Sir John recommends that the evolution of this type should be carefully watched, and that it should be adopted when stability has been reached, as it will form a most valuable addition to Australia's defences against sea-borne attack.

As regards the two boat flights at Point Cook and Lake Macquarie, the first station is considered economical during peace, while the other covers both Sydney and Newcastle. The mobility of the flying boat is limited only by supplies of fuel, and a string of lakes and protected waters for 2,000 miles from Melbourne to Townsville renders operation a simple matter in all weathers. The slipways at Albany, Darwin and Brisbane extend their sphere of operations to distant points on the coast. If possible, torpedo-bomber aircraft ought to be able to land near the slipways.

The single-seater fighter flight at Point Cook will not be fully mobile but can be made so at short notice, while the flight at Richmond will be on a completely mobile basis.

The C.A.F. bombing squadron at Perth will be able to co-operate with the army in Western Australia and will be able to act against sudden attack from the sea.

The Fleet Co-operation Flight, now on a reduced establishment, should be brought up to strength by the addition of 7 officers and 22 other ranks, owing to the completion of the seaplane carrier H.M.A.S. "Albatross," and the increase in the number of Australian cruisers. It is understood that the cost of the initial equipment of this unit will be borne by funds for naval construction, but its maintenance will be a charge on air force funds.

The development of air routes is a matter for the Controller of Civil Aviation, but it has a vital bearing on air defence, and Sir John says that the closest possible co-operation should be maintained between the two branches and no opportunity should be lost of establishing air routes and bases in areas of strategic importance. He suggests the following air routes as of primary strategic importance:—

- (1) Perth-Adelaide-Melbourne-Sydney-Brisbane.
- (2) Sydney-Charleville-Cloncurry-Darwin.
- (3) Albany-Perth-Darwin.

### Summary of Recommendations

#### 1. Composition of Operational Units

(a) That a proportion of the operational units of the R.A.A.F. should be maintained on a permanent basis.

(b) That Citizen Air Force squadrons should be confined to one type of aircraft, and to one operational rôle.

#### 2. Training

(a) That course "A" at the Flying Training School should be extended to 12 months.

(b) That the F.T.S. be reduced to an organization of H.Q. and two flights.

(c) That the F.T. course "A" be run on the system of a half-yearly intake of new pilots.

(d) That the number of hours devoted to specialist air and ground instruction should be increased.

(e) That flying instruction of C.A.F. officers should be carried out at the respective C.A.F. squadrons.

(f) That, if not available locally, nine officers be sent to England on long courses to qualify as specialists.

#### 3. Equipment and Supply

(a) That No. 1 Aircraft Depot, Laverton, be cleared of out-of-date stocks.

(b) That the Auditor-General be asked to accept new "Commencing Balances" at the conclusion of the stock-taking now in progress at the depot and units.

(c) That the stocktaking and work on vocabulary of stores be pushed on.

(d) That the Director of Supply at R.A.A.F. H.Q. have a voice in the deliberations of the Air Board.

(e) That a senior stores officer be sent to England to study stores establishments in the R.A.F.

#### 4. Personnel

(a) That the existing systems of entering officers to commissions be continued with the addition:—

(b) That a R.A.A.F. Wing be established at the R.M.C., Duntroon, for training R.A.A.F. cadets in a three-years' course.

(c) That cadets on this course obtain flying instruction at the squadron at Canberra.

(d) That the conditions of service be examined and bettered in certain particulars.

#### 5. Development

(a) That within the next nine years there be added to the strength of the R.A.A.F. units and facilities as above.

(b) That the army co-operation squadron should contain one squadron leader who has undergone a long course in army co-operation with the R.A.F., and one flying officer who has undergone a long course with the R.A.F. in Signals.

#### 6. Establishments

(a) That the Experimental Establishment at Randwick be closed down.

### Financial Aspect of Recommendations

Two of the recommendations will result in a saving, namely, the reduction of the F.T.S., estimated at £34,000, and the closing down of Randwick, estimated at £9,000 per annum.

The total capital cost is estimated at £1,990,500, and the total annual expenditure on completion of the programme at £1,139,800.

Since the report was published in Melbourne, Mr. Bruce has announced that his Government has accepted it. The development is to be divided into three periods of three years, and the cost of the first period has been undertaken by the Government.



# THE ROYAL AIR FORCE

London Gazette, November 6, 1928

## General Duties Branch

The follg. are granted short service commissions as Pilot Officers on probation with effect from and with seniority of November 2 :—A. H. Abbott, F. S. Barron, A. G. M. Cary, C. B. Field, E. G. Granville, N. R. G. Hunter, R. I. Johnson (sec. Lieut., 67th Field Bde., R.A., T.A.), J. A. Lawson (Lieut., A.I.R.O.), H. L. McCulloch, R. M. Messiter, G. F. P. O'Farrell, O. J. O'Hara, C. E. W. N. C. Pelly, C. Sarsfield-Sampson, W. H. E. Tew, R. W. Wallace, E. C. A. Wheeler, T. E. Whittope.

The follg. are promoted with effect from November 7 :—Flight-Lieuts. to be Sqdn.-Leaders.—L. H. Cockey, J. W. B. Grigson, D.S.O., D.F.C., L. O. Brown, D.S.C., A.F.C., R. Jope-Slade, D.S.C., W. Underhill, D.S.C. Flying Officers to be Flight-Lieuts.—H. T. Herring (Hon. Flight Lieut.), C. H. A. Stevens, J. H. C. Wake, E. S. C. Vaughan, M.C., W. F. R. Gough (Hon. Flight Lieut.), E. C. Dearth, C. W. McK. Thompson, S. P. George.

Flying Officer J. Constable-Roberts is transferred to Reserve, Class A (November 1); Flying Officer J. F. Young is transferred to Reserve, Class C (November 1); Flying Officer F. H. Bailey resigns his short service commn. (October 19); Lieut. A. M. Kimmins, R.N., Flight Lieut., R.A.F., ceases to be attached to R.A.F. on return to Naval duty (November 5). The follg. Lieuts., R.N., Flying Officers, R.A.F., cease to be attached to R.A.F. on return to Naval duty :—G. R. M. Robertson (September 5); J. H. F. Burroughs (October 20). The short service commn. of Pilot Officer on probation W. C. Garrett-Petis is terminated on cessation of duty (November 5).

## Stores Branch

The follg. Pilot Officers on probation are confirmed in rank and promoted to rank of Flying Officer :—B. Allen, C. L. Thompson, E. F. Smith, A. Connock, M. E. O'B. Atkinson (October 15); A. H. E. Frost (October 19).

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified :—

### General Duties Branch

Air Vice-Marshal Sir R. Brooke-Popham, K.C.B., C.M.G., D.S.O., A.F.C., to H.Q., Iraq Command, pending taking over command, 1.11.28.

Air Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., to H.Q., Fighting Area, Uxbridge, for Air Staff duties, 1.10.28.

Group Captain W. R. Freeman, D.S.O., M.C., to R.A.F. Training Base, Leuchars, pending taking over command, 27.10.28.

Wing Commanders : F. E. T. Hewlett, D.S.O., O.B.E., to H.M.S. *Furious*, for duty as Senior Air Force Officer, 8.10.28. C. W. H. Pulford, O.B.E., A.F.C., to R.A.F. Depot, Uxbridge, pending commencement of next course at Imperial Defence College, 16.10.28. V. Gaskell-Blackburn, D.S.C., A.F.C., to R.A.F. Depot, Uxbridge, 1.11.28.

### General Duties Branch

Squadron Leaders : A. Gray, M.C., to R.A.F. Base, Malta, 27.10.28. E. B. Peauman, to R.A.F. Depot, Uxbridge, 17.10.28. H. W. G. J. Penderel, M.C., to No. 216 Sqdn., Middle East, 20.10.28. R. Halley, D.F.C., A.F.C., to H.M.S. *Eagle*, 27.10.28.

Squadron Leaders : R. H. Kershaw, to R.A.F. Base, Malta, 30.10.28. N. H. Bottomley, A.F.C., to No. 4 Sqdn., S. Farnborough, 15.10.28. V. Greenwood, to H.Q., Fighting Area, Uxbridge, 2.10.28. J. C. Slessor, M.C., to Air Ministry (Directorate of Operations and Intelligence), 15.10.28. G. D. Nelson, D.S.C., A.F.C., to R.A.F. Depot, Uxbridge, 6.10.28.

Flight Lieutenants : J. M. J. C. J. I. Rock de Besombes, to No. 21 Group H.Q., West Drayton, 13.11.28. E. B. Grenfell, A.F.C., to No. 100 Sqdn., Bicester, 22.10.28. G. A. H. Pidcock, to Air Ministry (Directorate of Training), 22.10.28. C. Crawford, to Armament and Gunnery School, Eastchurch, 5.9.28.

Flight Lieutenants : R. V. Goddard, to Air Ministry (Directorate of Organisation and Staff Duties), 22.10.28. G. Martyn, to No. 1 Air Defence Group H.Q., 1.10.28. L. W. Jarvic, to No. 504 Sqdn., Hucknall, 1.12.28. W. J. Daddo-Langlois and R. H. Horniman, to No. 482 Flight, Cattewater, 7.11.28. W. E. G. Mann, D.F.C., to R.A.F. Station, Northolt, 11.11.28. G. L. Ormerod, to H.Q., Wessex Bombing Area, Andover, 17.9.28. O. E. Worsley, to No. 503 Sqdn., Waddington, 3.11.28. C. Chapman, D.S.C., to R.A.F. Station, Upavon, 18.12.28. A. P. Revington, to No. 482 Flight, Cattewater, 14.10.28.

Flying Officers : G. L. G. Richmond, to No. 10 Sqdn., Upper Heyford, 5.11.28. N. A. P. Pritchett, to R.A.F. Training Base, Leuchars, 12.11.28. J. W. M. Nancarrow, to R.A.F. Depot, Uxbridge, 12.10.28. H. D. Gunton, to R.A.F. Depot, Uxbridge, 2.11.28. R. F. Shenton and H. F. G. Southey, to No. 482 Flight, Cattewater, 14.10.28. C. G. Lucas, to R.A.F. Depot, Uxbridge, 12.10.28. W. G. Abrams, to No. 482 Flight, Cattewater, 10.10.28.

## AIR MINISTRY NOTICES

### NOTICES TO AIRMEN

#### Examination for Air Navigators.

An examination for 1st and 2nd Class Air Navigators' licences will be held at the Air Ministry, Gwydyr House, Whitehall, on Monday, Tuesday and Wednesday, December 3, 4 and 5, 1928.

Candidates for the 1st class licence will also be required to attend at Croydon Aerodrome on Thursday, December 6, 1928, for a practical examination in meteorology.

Application forms, the syllabi, and conditions of examination, may be obtained on application to the Secretary, Air Ministry (C.A.2), Gwydyr House, Whitehall, London, S.W.1.

Formal applications (on form C.A.2c) to sit at this examination, together with the prescribed fees, should be received at the above address not later than November 21, 1928. Candidates should give with their applications full details of any qualifications and experience they already possess.

Before a licence can be issued, candidates will have to pass a medical examination at the Central Medical Board, 5-6, Clements Inn, London, W.C.2. In the case of 2nd class navigators, arrangements can be made for this examination to take place on December 5, 1928, if early application is made to be examined on that day. Special arrangements will be made for the medical examination of 1st class navigators.

(No. 73 of 1928.)

#### Civil Air Navigators : Postponement of New Regulations

It is notified :—

1. The requirements concerning the carriage of navigators set forth in Notice to Airmen No. 82 of 1926 are still under revision, and the introduc-

## Medical Branch

Flying Officer (Quartermaster) P. H. Musgrave is promoted to rank of Flight Lieut. (Quartermaster) (November 3).

## RESERVE OF AIR FORCE OFFICERS

### General Duties Branch

The follg. officers are transferred from Class A to Class C :—Flight-Lieut. W. E. C. B. Forsyth (October 24); Flying Officer A. C. Heaven, M.C. (May 12); Flying Officer H. Rhodes (October 13); Flying Officer J. D. Parkinson is transferred from Class AA to Class C (September 22); Flying Officer H. J. Phillips is transferred from Class C to Class AA (October 29); Flying Officer R. K. Rose resigns his commn. (April 1). Pilot Officer on probation J. H. Dixon relinquishes his commn. on account of ill-health (November 7). Sqdn.-Ldr. M. E. A. Wright relinquishes his commn. on completion of service, and is permitted to retain his rank (August 1).

### Special Reserve

Pilot Officer C. E. W. N. C. Pelly resigns his commn. on appointment to a short service commn. (November 2).

## AUXILIARY AIR FORCE

### General Duties Branch

No. 603 (City of Edinburgh) (Bombing) Squadron :—The follg. to be Pilot Officer :—A. M. Mitchell (September 29).

Pilot Officers : F. T. R. Bullmore, to No. 10 Sqdn., Upper Heyford, 22.11.28. J. H. L. Dillon-Trenchard, to No. 407 Flight, Mediterranean, 25.10.28.

Pilot Officers : The undermentioned Pilot Officers are posted to R.A.F. Depot, Uxbridge, on appointment to Short Service Commns. (on probation) with effect from 2.11.28 :—A. H. Abbott, F. S. Barron, A. G. M. Cary, C. B. Field, E. G. Granville, N. R. G. Hunter, R. I. Johnson, H. L. McCulloch, R. M. Messiter, G. F. P. O'Farrell, O. J. O'Hara, C. E. W. N. C. Pelly, C. Sarsfield-Sampson, R. W. Wallace, and T. E. Whittope.

### Stores Branch

Flight Lieutenants : A. Walters, to Air Ministry (Directorate of Equipment), 20.10.28. N. Robertson, to Air Ministry (Directorate of Equipment), 20.10.28.

Flight Lieutenant P. J. Murphy, to Supply and Stores Depot, Aden, 2.11.28. Flying Officer : R. G. Fussell, to School of Army Co-operation, Old Sarum, 4.12.28.

Flying Officers W. H. Bowden, to R.A.F. Station, Northolt, 7.11.28. C. P. Marshall, to R.A.F. Station, Tangmere, 7.11.28. R. N. Hesketh, to No. 4 Stores Depot, Ickenham, 12.11.28. B. G. Pool, to No. 1 Sch. of Tech. Training (Apprentices), Halton, 12.11.28.

Pilot Officers : G. Matthews, to No. 3 Flying Training Sch., Grantham, 12.11.28. L. F. Oldridge, to No. 1 Stores Depot, Kidbrooke, 12.11.28. J. S. French, to Sch. of Balloon Training, Larkhill, 12.11.28. E. J. H. Starling, to No. 1 Sch. of Tech. Training (Apprentices), Halton, 12.11.28. J. W. Hunt, to No. 2 Flying Training Sch., Digby, 12.11.28. P. V. Edwards, to No. 5 Flying Training Sch., Sealand, 12.11.28. J. E. Reynolds, to R.A.F. Depot, Uxbridge, 12.11.28. F. G. Lee, to No. 1 Flying Training Sch., Netheravon, 12.11.28.

### Accountant Branch

Flying Officer W. R. Donkin, to No. 504 Sqdn., Hucknall, 30.10.28.

Flight Lieutenant : K. R. Money, O.B.E., to Marine Aircraft Experimental Estab., Felixstowe, 27.10.28.

### Medical Branch

Squadron Leader A. F. Rock, M.R.C.P., D.P.H., to R.A.F. Pathological Lab., Halton, 1.12.28.

### Chaplains' Branch

Rev. G. H. Collier, M.A., to R.A.F., Base, Calshot, 26.11.28.

## NAVAL APPOINTMENT

The following appointment was made by the Admiralty on October 30 :—Lieut. (Flying Officer, R.A.F.) J. Brett, to *Courageous*.

tion of Regulations governing the circumstances in which a navigator must be carried on aircraft has been further postponed from January 1, 1929, to January 1, 1930.

2. Cancellation.—Notice to Airmen No. 88 of 1927 is cancelled. (No. 74 of 1928.)

## NOTICE TO GROUND ENGINEERS

### Safety Belts in Aircraft

1. ATTENTION is drawn to the requirements of the Air Navigation Directions with regard to the provision and maintenance of safety belts in civil aircraft.

2. Paragraph 49 (1) (i) (a) of the Air Navigation Directions (A.N.D. 6) calls for the provision, in all flying machines, of a safety belt for each person, including the pilot, carried in an open cockpit.

3. Safety belts are regarded as part of the equipment of the aircraft, and both the belt itself and its attachment to the aircraft are therefore included in the items to be inspected and certified by a Ground Engineer licensed in category "A," in accordance with paragraphs 43 (a) and 44 (1) (a) of the Air Navigations Directions as amended by A.N.D.6A. In any case in which it is suspected that the strength of a safety belt has deteriorated, the Ground Engineer should remove the belt from the aircraft, support it by any convenient means in a manner similar to that in which it is attached in the aircraft and apply a proof load of 500 lbs. by loading the centre of the belt.

(4) Attention is drawn to Notice to Ground Engineers No. 4 of 1920, which also deals with the question of safety belts and harness and is still operative. (No. 5 of 1928.)

## CORRESPONDENCE

The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns

### A CENTRAL EXPERIMENTAL STATION

[2176] After the lessons of the war, in regard to the value of scientific experiment, it was said that this country was to turn over a fresh leaf, and encourage systematically those who came forward with new ideas.

We are afraid, however, that in many cases it is little more than lip service we are still paying in this country to invention and research.

Take aeronautics. Daily we are brought into touch with inventors. Many, we find, are devoting their ingenuity towards solving problems in aviation. Many, too, ask our advice as to having their inventions tested without delay in an independent and technically conclusive way.

What can one say? The Air Ministry has too small a grant for purely experimental work. It is unable, for lack of funds, to explore many avenues which its experts seek urgently to traverse. It cannot be expected to have time or funds for investigating promptly, on an experimental basis, a large number of outside ideas.

As for the aircraft industry, it has as much as it can do, generally speaking, to keep its head above water, and certainly cannot devote the time it would like to experiment.

Inventors are between the devil and the deep sea. Officially we starve aeronautical research, while our firms, with a few exceptions, are unable to bear the burden of experimental work.

In Germany, where they lead the world in air research, arrangements are made officially whereby laboratories all over that country—chiefly those connected with universities—are in a position to investigate any and every idea of private origin which seem worthy of being tested.

It is agreed that aviation is vital to the Empire. That being so we suggest that it is essential that there should be in this country some central, completely-equipped laboratory and experimental station staffed by experts whose sole task it would be to probe thoroughly and immediately every new air idea submitted by inventors for its consideration. It should be in a position also to conduct full-scale trials in cases where these were justified.

One realises that many schemes submitted would be unworkable. But we are perfectly certain that it would repay a thousandfold to foster, rather than neglect, the clever brains outside official or trade circles which are now seeking so ardently to improve the speed, safety and practicability of aerial travel.

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### R.A.E.S. AND INST.A.E.E.

Official Notice

On Thursday, November 22, 1928, Major T. M. Barlow, F.R.Ae.S., will lecture before the Royal Aeronautical Society in the lecture hall of the Royal Society of Arts, at 6.30 p.m., on "Weight of Aircraft."

From the earliest days of aviation, aircraft designers have been engaged in a constant struggle to reduce the weight of aircraft consistent with strength and safety. In the course of his lecture, which will be fully illustrated, Major Barlow will point out how weight has been saved during the past 10 years, and how further reductions in weight can be foreshadowed. Major Barlow deals with all aspects of the problem, from the effect of weight and size on performance to the possibilities of reducing engine weight, chassis weight, airscrew weights, etc., and shows that with present materials engines and construction, there is a definite limit for the aeroplane, and a definite limit to the range which can be expected from it. The whole problem is considered in close detail, and the results given are of the great importance to every designer.

### Air Council's Award to Steam Trawler's Crew

THE Air Ministry announces:—The Air Council have awarded a piece of plate to Mr. Harry Reeve, skipper of the steam trawler "Kittiwake," of Lowestoft, and a sum of money to the mate, chief engineer, and six other members of the crew, in recognition of their services in effecting the rescue of the officers and airmen of Southampton flying-boat No. 1125, which came down in Cardigan Bay on June 30, 1928. The Board of Trade have been requested by the Air Ministry to present these awards on behalf of the Air Council.

### Royal Air Force Flying Accidents

THE Air Ministry regrets to announce that as the result of an accident near Boothby Graffoe, Lincolnshire, to an Avro machine of No. 2 Flying Training School, Digby, on November 7, Pilot Officer Richard Harold Coupe, the pilot and sole occupant of the aircraft, was killed.

As the result of an accident at Preston Moor, Yorkshire, to an Atlas machine of No. 26 (Army Co-operation) Squadron, Catterick, on November 6, Pilot Officer Charles Lilburn Myers, the pilot of the aircraft, and 359460 A.C.2 Henry Chadwick, were killed.

As the result of an accident near Buckingham to a Hawker Horsley machine of No. 100 (Bombing) Squadron, Bicester, on November 8, 351106, Sergeant Herbert Edward Lockwood, the pilot of the aircraft, was killed, and 365544 A.C.2 Charles Robert Thane was seriously injured.

## IMPORTS AND EXPORTS

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910.)

For 1910 and 1911 figures see FLIGHT for January 25, 1912.

For 1912 and 1913, see FLIGHT for January 17, 1914.

For 1914, see FLIGHT for January 15, 1915, and so on yearly, the figures for 1927 being given in FLIGHT, January 19, 1928.

	Imports.		Exports.		Re-Exports.	
	1927.	1928.	1927.	1928.	1927.	1928.
Jan. ..	1,850	1,220	49,021	157,598	—	330
Feb. ..	679	1,772	63,080	118,622	—	345
Mar. ..	7,087	4,805	106,478	125,901	2,270	1,307
April ..	822	2,904	71,190	134,126	785	3
May ..	1,258	2,513	82,708	118,804	640	640
June ..	1,249	5,916	149,907	86,245	162	1,317
July ..	1,798	2,025	104,167	108,746	750	521
August	2,453	2,566	78,742	97,303	—	100
Sept. ..	2,045	4,240	61,946	72,475	59	3,183
Oct. ..	1,013	6,098	93,004	77,027	45	315
	20,254	34,059	860,243	1,096,847	4,711	8,061

## PUBLICATIONS RECEIVED

*Aeronautical Research Committee Reports and Memoranda.* No. 1121 (*Ae.* 294).—The Experimental Determination of the Trajectory of Aircraft Bombs. By H. E. Wimperis. June, 1928. Price 1s. 6d. No. 1138.—The Determination of the Elastic Moduli of a Mild and a Medium Steel. By H. E. Smith and H. L. Cox. June, 1927. Price 6d. net. H.M. Stationery Office, Kingsway, London, W.C.2.

*Some Regions of Formation of Depressions in the North Atlantic.* By L. Doris Sawyer, B.A. Air Ministry, Meteorological Office: Professional Notes No. 50. H.M. Stationery Office, Kingsway, London, W.C.2. Price 4d. net.

*The Law in Relation to Aircraft.* By L. A. Wingfield, M.C., D.F.C., and R. B. Sparkes, M.C. Longmans Green & Co., Ltd., 39, Paternoster Row, London, E.C.4. Price 12s. 6d. net.

## AERONAUTICAL PATENT SPECIFICATIONS

(Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.)

### APPLIED FOR IN 1927

Published November 15, 1928

- 13,381. D. E. TURNER. Rotary i.c. engines, etc. (298,690.)  
 19,309. SPERRY GYROSCOPE Co. Automatic steering of dirigible vehicles. (299,087.)  
 19,401. VICKERS, LTD., and R. K. PIERSON. Tail skids. (299,087.)  
 21,171. T. R. CAVE-BROWNE-CAVE. Airships. (299,123.)  
 21,272. A. SOLDENHOFF. Aerofoils. (299,124.)  
 25,745. F. DURRET. Helicopters. (299,168.)  
 27,787. ROHRBACH METALL-FLUGZEUGBAU Ges. Monoplanes. (279,458.)  
 28,651. M. LOBELLE. Controlling-devices for aeroplanes. (299,192.)  
 32,405. H. HOCKE. Aeroplanes with stabilizing surfaces. (299,212.)  
 33,988. PHOTOGRAMMETRIE Ges. Cameras for taking aerial photographs. (282,422.)

### APPLIED FOR IN 1928

Published November 15, 1928

- 1,258. H. GRUNEWALD. Flying-apparatus. (289,829.)  
 6,653. P. DE F. HIBNER. Rotary i.c. engines. (298,937.)  
 13,689. H. D. FOWLER. Planes for aircraft. (299,274.)  
 14,895. UDET-SCHLEPPSCHRIFT Ges. Displaying advertisements by means of aircraft. (291,396.)

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